ISSUE 165 OCTOBER 2005

Better Homes and Gardens®

WOOD®

The Shop-Proven Woodworking Magazine

BEST TABLESAW BLADES p.22

compact, store-all entertainment center

complete building plans p.42

Snap-off back panel for easy wiring!

Center console for electronics

Supports TVs up to 42" wide

Slide-out drawers for dozens of tapes and DVDs

easy-to-build **bookcase**

p.76

SKILL BUILDERS —

- Adjusting jointer knives
- How to eliminate tear-out
- Cutting dovetail lap joints
- Scaling projects from photos

make this eye-popping **jewelry box**

p.64

WOOD®
October 2005, Issue 165

PROJECTS

28 easy-adjust router trammel
42 compact entertainment center
52 dead-blow mallet
64 a gem of a jewelry box
76 build-in-a-weekend bookcase
86 artist's easel for kids
94 take-anywhere hardware bins
96 straight-tracking crosscut sled

TECHNIQUES

20 turn pictures into project plans
36 how to adjust jointer knives
38 the (almost) handcut dovetail lap joint
59 stop tear-out while machining wood
74 woodworkers tell how to pinch pennies
82 four bookcase design options
90 10 keys to building *WOOD* projects
From stock selection to assembly, develop the regimen needed to build flawless projects from plans.

TOOLS & MATERIALS

10 a look at low-cost CNC machines
22 which 10" saw blades do you need?
See how well rip, crosscut, and combo saw blades cut, and choose the type best suited for your needs.
32 the safest tablesaw on the market
70 clamp-on tool guides
We test and compare the performance of eight systems to make your buying decision a no-brainer.
84 guide to woodshop work surfaces
Check out the pros and cons of eight materials meant to take abuse atop your workbench.
92 wise buys: detail sanders

DEPARTMENTS

6 editor's angle
8 sounding board
12 ask *WOOD*
24 shop tips
112 what's ahead

WOOD MAGAZINE SHOP TESTED APPROVED®

This seal is your assurance that we build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

Better Homes and Gardens®
WOOD®

October 2005 | Vol. 22, No. 5 | Issue No. 165

We asked our staff:

What's your single best piece of advice for beginning woodworkers?

Learn by building small projects from plans; expand your knowledge by modifying plans to suit your needs.

Invest in precise measuring tools. You're only as accurate as your measurements and equipment setup.

Purchase needed lumber and hardware *before* starting a project, in case an item has been discontinued or changed.

Label parts for mistake-free machining and assembly.

Have plenty of scrapwood on hand so you can perform a "test pass" for every cutting and routing operation.

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CUSTOMER SERVICE: 800/374-9663
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Vice President/Publishing Director **DOUG OLSON**
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ADVERTISING
CHICAGO OFFICE: 333 N. Michigan Ave., Suite 1500, Chicago, IL 60601
Phone: 312/853-2890 Fax: 312/580-7906
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In Memoriam — E.T. Meredith III (1933–2003)

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editor's angle

the unstoppable will to woodwork

No matter what life dishes out, most of us will find a way to keep working with wood. Take *WOOD*® magazine reader Bill Shea for example. He wasn't going to let a little thing like a tour of duty in Iraq interfere with his passion for making Shaker boxes.

Photo: Sgt. Maj. John Sheehan

Most of us don't keep a 9mm handgun on our hip while in the workshop, but reader Bill Shea had to during his stay in Iraq.

When Lieutenant Colonel Shea, a member of the U.S. Army Reserves, was called to duty back in December 2003, he planned to put his woodworking on hold. And he did—until he couldn't take the sawdust deprivation any longer. After serving in Iraq for several months and having settled into a "routine" (if there is such a thing in a land where people are shooting at you), he decided to do something about it. When not performing logistical support operations (moving stuff into and around Iraq), Lt. Col. Shea found he had a few precious hours of down time each week, but few ways to enjoy it. So—you guessed it—he started making Shaker boxes.

There was one big problem, though: Unlike you and I, Bill couldn't just hop into his Hummer, drive down the street, and buy the needed tools and supplies. So he got on the Internet, went to Lowes.com, and ordered a Delta benchtop belt/disc sander. The machine arrived just 10 days later.

Next, Bill asked his son Michael, back home in Dalton, Massachusetts, to mail out his Shaker-box-making supplies, including cherry wood bands, copper tacks, forms, clamps, tack hammer, and a hot plate. Those materials arrived 20 days later.

Photo: Hancock Shaker Village, Pittsfield, Mass.

At this point Bill had all he needed, except for a workbench and the all-important soaking trays used for making the bands pliable. He quickly assembled a bench from scrounged 2×4s and plywood. And for soaking trays he located two sizes—one welded together from an old toolbox (for size No. 1 and 2 boxes), and the other, a plastic cooler (for size No. 3 boxes). He set up the shop in the hallway of his living quarters.

Always one to share his love of woodworking with others (Bill demonstrates Shaker box-making at Hancock Shaker Village in Pittsfield, Massachusetts), he taught 15 other men and women from his unit how to make a box. Together they made more than 60.

None of this would have come to our attention, except for the fact that we chose Bill's shop (the one in Massachusetts, not Iraq) for a Workshop Workover in the next issue. (He returned stateside just three months before we invaded his workspace.) If you have a small, sometimes-cluttered shop, you'll want to see the many ways we found to quickly put Bill's basement workplace in order.

So enjoy your shop time, and don't let anything keep you from it!

Bill Krier

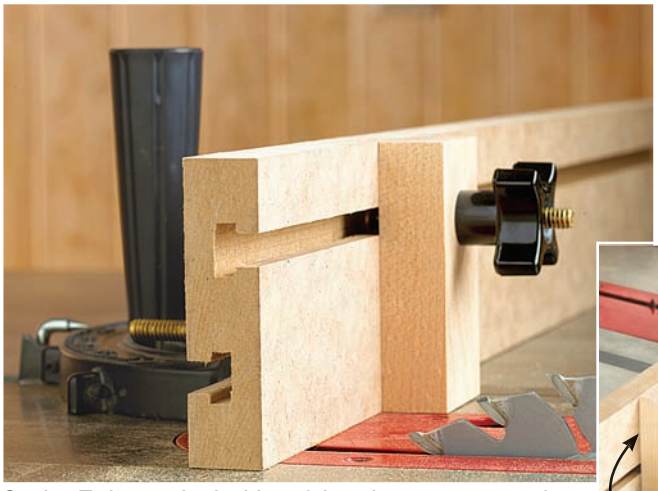
sounding board

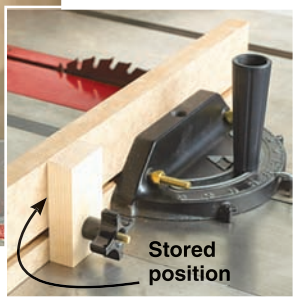
Our bulletin board for letters, comments, and timely updates

Flip-flop and add a stop to your miter-gauge extension

Thank you for the adjustable miter-gauge extension idea in issue 162. It's a great addition to my tablesaw accessories. I did make changes to the original plan. First, I cut the T-slots on both sides of the extension. And, I add an adjustable stopblock. The extension is still reversible and I can store the stopblock on the extension at all times rather than searching around for a block and C-clamp.

John McCue, Belvidere, Ill.





Cutting T-slots on both sides of the miter-gauge extension allows for adjustable stopblock use and storage.

Blade scoring and glue joints

The photo in the upper left corner of page 78 in issue 163 shows blade scoring on the test pieces. Related copy said, " None of the cuts were ready for glue joints straight from the saw...." Why is a bit of scoring not acceptable for glue joints? I often scuff up the joint with sandpaper to get better glue adhesion. Please help clarify this for me.

Mikkel Hansen, Black Mountain, N.C.

Good question, Mikkel. The photo of the test pieces shows considerable scoring. That amount of scoring will not allow the joint to close completely, leaving small gaps in the joint and an uneven glue film. Woodworking glues are not formulated for gap filling, so a weak joint will result. Using sandpaper to scuff the joint surface creates small voids on the joint's edges, also resulting in a joint weaker than one produced from smooth-jointed edges with no gaps.

The WOOD® magazine staff

From a low-dough to a no-dough workbench

I am putting my shop back together after a three-year hiatus due to a move. One of the items that did not make the move was my workbench, and so I needed a new one. I don't have a lot of money to throw into niceties, and the workbench in issue 163 seemed like a good idea.

As it turned out, the only thing I spent to make the workbench was my time. The previous owner of our home left behind a 36×80" solid-core door that makes a sound benchtop, and the rest of the lumber came from scrap left in the garage.

I mounted a woodworking vise, drilled holes for the bench dogs, and applied four coats of finish to the top, see *below left*, making a rock-solid bench at the right price.

Tom Rascon, Mansfield, Texas

Article updates

April/May 2005, issue 162

- On page 106, the Rockler Woodworking and Hardware phone number should read 800/279-4441.

June/July 2005, issue 163

- On page 30, shop tips, the illustration at the bottom of the page should show the feather-board fingers applying pressure to the workpiece *only* in front of the blade.
- In Drawing 5b, page 46, the ⅜" dimension should be 1⅜".
- On page 80, the phone number for the Ridgid TS2400 should be 800/474-3443.
- On page 81, In-Line Industries' Web site should be in-lineindustries.com.

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For an up-to-date listing of changes in dimensions and buying-guide sources from issue 1 through today, go to **woodmagazine.com/editorial**.

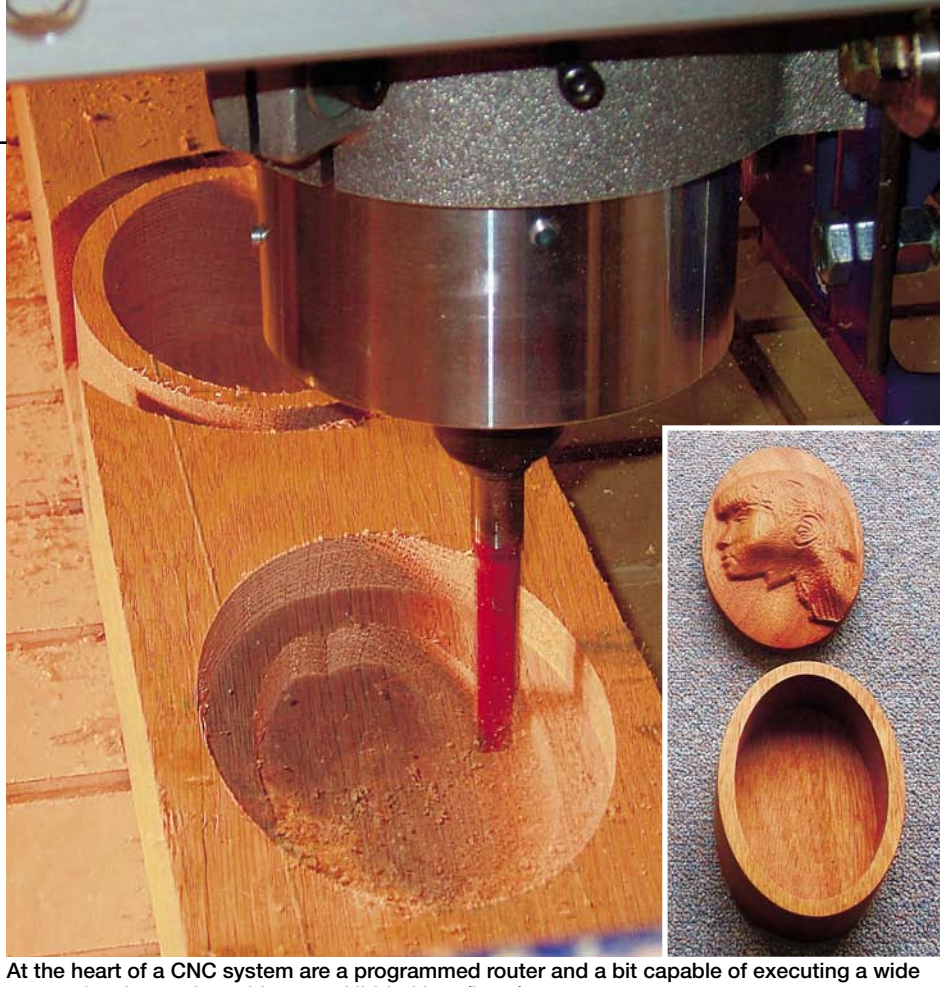
Tomorrow's woodworking today with CNC routers

How many times have we seen a high-tech product start out high-priced, and then watch it inch down in cost, becoming affordable for a broader audiance? Computers, DVD players, and digital cameras have all traveled that highway. And now, in woodworking, CNC (computer numerically controlled) cutting machines have joined the parade. ShopBot Tools, Inc, located in Durham, North Carolina, has figured a way to produce quality, production-oriented CNCs from $6,995 to $10,995. That's about one-fifth the cost of industrial models found in factories that mass-produce plastic and wood parts.

The bare-bones ShopBot CNC consists of a motorized tool, typically a router and bit, that's suspended over the workpiece from a moving framework. Following software instructions created by the woodworker on a home computer, the motorized tool zips over and around the workpiece, performing any number of tasks—dadoing, mortising, carving, drilling, and so on. There's even a lathe operation available. End products include replicas of antique furniture parts, precisely cut pattern pieces, cabinet components, and signs carved in relief. (See the photos at *bottom.*) More sophisticated software and ShopBot models let you take a 2-D photo of a dog, for example, and create an impressive 3-D relief suitable for display.

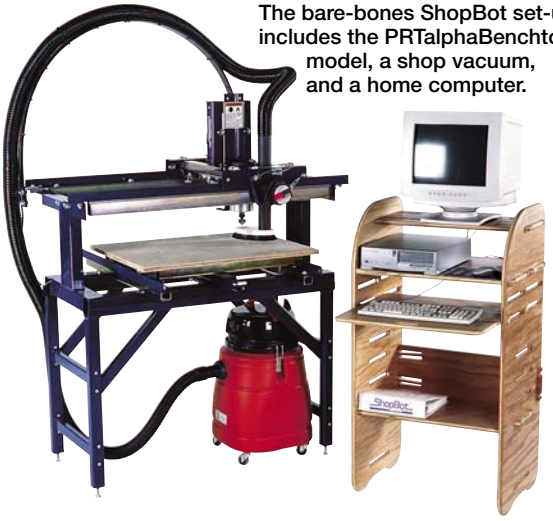
All that's fine, but how can a CNC help you? Equipped with the right task-specific software and accessories, a CNC router can shape and mill material safer, more precisely, and much faster than anything in your workshop. For the aspiring production-oriented woodworker, this can translate into flawless workmanship, time savings, and money in the bank.

To find out more, Executive Editor Jim Harrold attended a ShopBot Jamboree in April of 2005. This is where tool owners network and share experiences. There, company owner and founder Ted Hall expressed a strong desire to improve the affordability of his line, in spite of already having sold 3,000 machines. Says Ted, "We'd like to make our tools so affordable and easy to use that they'll be right for every shop." Should he succeed, expect machines like the PRTalphaBenchtop model and accessories to replace the tablesaw as the go-to tool in the workshop of tomorrow. Of course, if you have the cash and want that experience today, pick up the phone and call 888/680-4466 or click shopbottools.com to learn more.



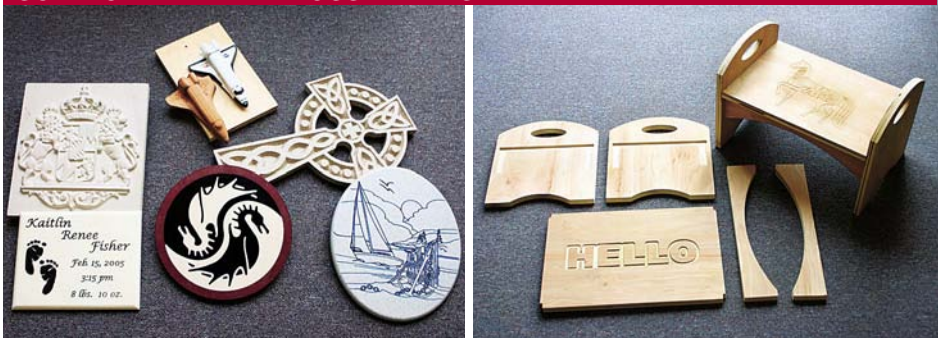
At the heart of a CNC system are a programmed router and a bit capable of executing a wide range of tasks, such as this carved lidded box (inset).

Photographs: ShopBot Tools, Inc.



The bare-bones ShopBot set-up includes the PRTalphaBenchtop model, a shop vacuum, and a home computer.

SOME OF THE MANY POSSIBILITIES



Signs, plaques, models, relief carvings, keepsake boxes, and easy-to-assemble furniture parts are just a smidgen of the projects originating from a ShopBot CNC tool.

ask wood

Answers to your questions from letters, e-mails, and WOOD Online®

How to keep bark parked

Q: I like to slice logs at an angle and use these slabs for fretwork. What do I have to do to keep the bark from drying, shrinking, and falling off the slab?

—Wes Kegel, Blue Earth, Minn.

A: You'll increase your success by cutting trees while they're dormant, Wes. Trees cut during their growing season have a moist and delicate cambium—the layer separating bark from sapwood. Cut most types of trees then, and bark easily peels off the trunks. For your purposes, harvest the tree in the late fall or winter while the cambium is firm.

That's just the start, though. The cross-sections shown at *left* began to check within days after being cut. To prevent excess shrinkage and make sure the bark stays on, soak the slices in a mixture of 30 percent polyethylene glycol (PEG) and water until the PEG replaces the water in the wood cells. Soaking times vary by thickness and wood species, but cross-sections quickly become saturated. Start with a soaking time of three weeks and experiment from there. After the wood is saturated with PEG, remove it and allow surface moisture to evaporate before working the cross-sections.

A downside to treating wood with PEG is that you'll need to seal the wood against moisture to prevent the chemical from leaching out. Protect your finished projects with two coats of polyurethane or, for a more natural look, Watco Danish Oil.

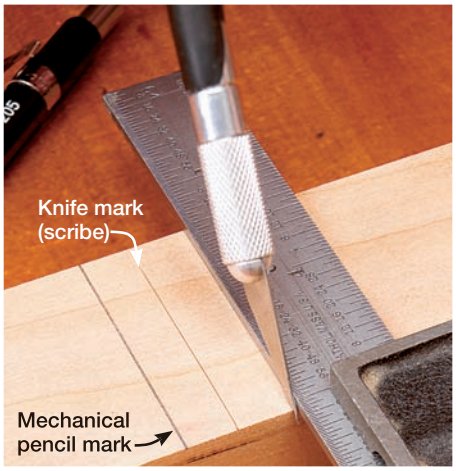
Polyethylene glycol is available from woodworking specialty stores, or Lee Valley Tools, 800/871-8158 or leevalley.com.

Marking knives: a cut above pencils

Q: I use a sharp pencil in the shop to mark crosscuts, mortise-and-tenon layouts, and dovetails. I see a big deal being made about marking gauges and small knives to mark the cuts and layouts. Why are these better? If I make a mistake, I can erase the pencil lines.

—Mike Jory, Castro Valley, Calif.

A: Marc Adams often hears this question from students at his woodworking school (marcadams.com). His reply: "A knife or marking gauge is a great way to get a precise line that your chisel can reference for a cut. Also, an accurately knifed layout line will help the saw blade track better. Because scribe lines can be difficult to see, I often use a very sharp pencil to darken them in. And remember, some people like to see just a hint of a knife line to prove that the joint was hand-cut."



Even fine-lead mechanical pencils leave wider lines than the tip of a crafts knife, shown side by side *above left*. The difference can be enough to separate a tight fit, seen on the left side of the dovetail lap joint, *above right*, from the slight gap seen to the right.

True, scribe lines can't be erased with a pencil. So follow the measure-twice-cut-once rule when laying out your cuts. If there's any doubt, make shallow score marks to start. You always can go back and sand them off if you've erred or deepen them, if necessary, before making your cuts.

continued on page 14

Hardness ratings help you choose the right species

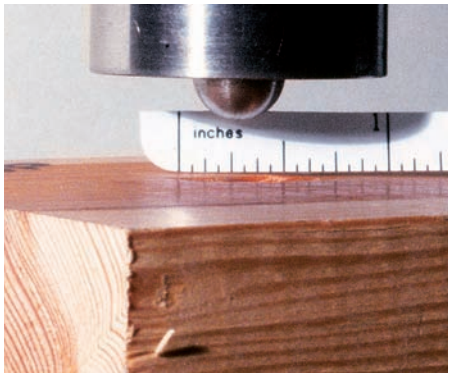
Q: I'm building a workbench that will, of course, take a lot of abuse. That started me wondering about the relative hardness of different woods. How is that determined, and how do the popular woodworking species rate?

—Dale Glesser, Lorain, Ohio

A: A procedure called the Janka hardness test provides the answers, Dale. Using a powerful press and a steel ball with a diameter of .444", technicians measure the force required to sink half the ball diameter into the face grain of a wood sample. The resulting number, expressed in pounds of force, determines the hardness rating of the species. Listed in order of increasing hardness, here are the results for a few wood species, as tested at 12-percent moisture content.

Wood Species	Pounds of Force Needed to Dent
Western red cedar	350
Eastern white pine	380
Coastal Douglas fir	710
Black cherry	950
Black walnut	1,010
Northern red oak	1,290
Beech	1,300
White oak	1,360
Sugar maple	1,450
Jarrah	1,910
Ipe	3,680
Lignum vitae	4,500

(Numbers from USDA Forest Products Laboratory)



Here's the business end of an Instron wood-hardness testing machine. The sample beneath is Douglas fir.

Stripping a finish

Q: I want to remove the clear finish from a piece of furniture. What is the best chemical to use? This isn't a valuable antique, merely an old table that's showing wear.

—Brian Greene, Monrovia, Calif.

A: As a first step, Brian, do a little detective work to determine the furniture finish. Lightly dampen a cloth with denatured alcohol, and gently rub a spot about 1" in diameter. After about 15 seconds, see if the finish has softened and is transferring to the cloth. If it does, the finish is shellac. If not, repeat the process with lacquer thinner. A softened finish this time identifies furniture with a lacquer finish. If the finish is still intact, it's some type of varnish.

Denatured alcohol and plenty of rags will completely remove a shellac finish. You may want to speed the process with a synthetic abrasive pad, such as a green Scotchbrite. Substitute lacquer thinner as the solvent, and you can strip lacquered furniture. For varnish removal, use a more aggressive solvent such as Formby's Furniture Refinisher. If that fails, you'll need a paint stripper. In any case, make this an outdoor project with plenty of ventilation, and invest in a respirator, protective gloves, and eyewear.

Rubbing a small spot with a variety of solvents will identify a furniture.

continued on page 18

Cutting wide dadoes efficiently

Q: Every time I use a dado set to cut half-lap joints, I seem to waste a lot of time lining up each successive cut to the edge of the blade. Is there a faster system?

—Pat Martin, Oak Park, Ill.

A: Here's a way that will save you time and energy, Pat. First, screw a plywood auxiliary extension to your tablesaw's miter gauge, and slide it once through the running dado blade to show you the edges of the cut. Use a pencil and square to draw a reference line from one edge of the cut up the face of the fence. Then make a series of evenly spaced marks away from your reference line along the face of the extension. Space these marks slightly less than the width of the dado cut, for example 11/16" apart for a 3/4" dado. Then make a single indexing mark on a strip of tape on the back of each workpiece to identify where your cut should start. Move that mark on the board to the next mark on the extension for each successive cut until you reach the other edge of your half-lap.

Align the start line on the workpiece with marks on the auxiliary extension to make a series of cuts totaling the dado's width.

Well-rounded dowels

Q: Is there a way I can add a round end to 1/4"- and 3/8"-diameter dowels? I would like to do this for axles on toy cars and trucks.

—Norm Camire, WOOD Online

A: You can produce a consistently rounded dowel end on your router table using a round-over bit that's half the radius of your dowel. For a 1/4" dowel, install a 1/8" round-over bit with guide bearing. For a 3/8" dowel, use a 1/8"- or a 3/16"-radius bit.

Start by raising the bit in your router table until the bottom edge of the bearing meets the center of the dowel as seen from the side. Then adjust the fence so that the center of the dowel, as seen from above, rests against the center of the bearing. Switch on your router and hold the dowel against the fence with one hand while you rotate it with the other. Slide the dowel against the bearing of the spinning bit to begin cutting. To avoid burning the end, back the dowel away from the bit slightly while you pause to adjust the hand that's rotating the dowel.

Finally, sand lightly by hand up to 180 grit to smooth and blend the rounded end with the rest of the dowel.

turn pictures into projects

Instead of just taking photos of your projects, design projects from your photos.

You know you're a woodworker if the rest of your family returned from summer vacation with souvenirs while you lamented the lack of project plans for antique furnishings you found in historic homes and museums.

Not to worry. Rough working drawings for the cabinets, tables, or chests you admired may be as close as your vacation snapshots if you have the skills to draw and work from a basic plan.

Do the right thing

When scouting for a choice piece, you can approximate dimensions from photos, given enough visual clues, but there's a more precise way to learn the same information: Ask. Museum and historic site staff may be more than willing to let you carefully measure an exhibit piece during your visit. Come prepared with soft cotton gloves, a non-marring vinyl or cloth tailor's tape, and a pencil and pad for sketches and notes.

Photograph objects close to straight-on to accurately measure them for size. The 1"-wide edge here will serve as a benchmark.

Measuring from photos

If all you have to work from are snapshots, begin by looking for a benchmark object in the photos. That's anything where you can closely estimate its size and apply that measurement to other objects.

As an example, we'll use the trunk, shown here, which was photographed at Living History Farms in Urbandale, Iowa (515/278-2400 or livinghistoryfarms.org). You could estimate the trunk's width based on the 5"-wide floor planks, but for this exercise, we'll assume the stock thickness, visible on the dovetail ends, equals 1". In our photo of the trunk, the dovetail ends measure 1/16" (.0625") wide. Using that benchmark, you can create a scale for translating other measurements in the photo using the ratio of .0625" to 1". To estimate the width of the trunk, which measures 3" in the photo, we use this equation:

$$\frac{.0625}{3} = \frac{1}{N}$$

To complete the equation and discover the dimension that equals "N," multiply the two known numbers that are diagonal from each other (1×3), and then divide the result (3) by .0625. That yields 48" for the estimated width of the trunk.

To find the height of the trunk minus the lid, we measure the photo along a vertical edge for a dimension of 1 5/16" (1.3125") and return to the equation used earlier:

$$\frac{.0625}{1.3125} = \frac{1}{N}$$

To simplify the math, divide 1.3125 by .0625 for a dimension of 21". That sounds precise, but these are still estimates. The photo at *left* was taken at a slight angle, which requires more guesswork to extract dimensions than straight-on photos.

Using snapshots and a little guesswork, we came up with dimensions of 47" wide, 28" high (with the lid), and 24" deep. So how close did we come? Measurements of the trunk revealed the actual dimensions are 47¼" wide, 29" high, and 21½" deep.

A trunk's simple shape, with major parts visible from the outside, makes it an easy project to duplicate. For more involved pieces that you're unable to measure, turn to reference books (see Sources) that provide a detailed look at similar pieces. If you plan to rely on photos for dimensions, and you're free to shoot them, include the following:

- Front and side views shot straight on.
- Details of joinery, where visible.
- Detail photos of hardware. Also, note the apparent finish.
- Details of moldings, carvings, and trim pieces.

Include enough of the rest of the cabinet to provide a size reference.

Sources

Antique furniture plans: *Measured Drawings of Eighteenth-Century American Furniture* by Ejner Handberg; Berkshire House Publishers.

Antique furniture dimensions: *Field Guide to American Antique Furniture* by Joseph Butler, Kathleen Eagen Johnson, and Ray Skibinski; Owl Books.

Identifying antique furniture: *The Bulfinch Anatomy of Antique Furniture* by Tim Forrest and Paul Atterbury; Bulfinch.

English, colonial revival and Victorian furniture styles: *The Big Book of Antique Furniture* by David P. Lindquist and Caroline C. Warren; Krause Publications.

Rip, crosscut, or combo:

Which 10" saw blades do you really need?

If you've gone shopping for a tablesaw blade recently, you might have noticed the job isn't as simple as it once was. Once upon a time, you bought one blade for ripping (cutting with the grain) and another for crosscutting—and spent half the day, it seemed, swapping blades on your saw.

Today, manufacturers sell 40-tooth "general purpose" blades and 50-tooth "combination" blades for tablesaws. They claim these hybrid blades work just as well cutting with the grain as across it. But there must be a compromise in quality between combo blades and dedicated rip and crosscut blades, right? To find the answer to that burning question, we compared the cuts of all three blade types, from several manufacturers, in solid stock and hardwood-veneer plywood. (A small fraction of our cut samples are shown in the box at *right*.)

Three key lessons learned from our tests

LESSON 1: RIPPING SOLID WOOD? RIP BLADES BURN LESS

Combination and 24-tooth rip blades both cut red oak cleanly when new. But after dulling them equally, combo blades burned more. We only saw this burning on solid wood; ripping veneered plywood, we observed no edge-burning or chipping of the veneer.

LESSON 2: CROSSCUT BLADES TURN "BURNISH" TO "BURNAGE"

When cutting across the grain, we found that new 60- and 80-tooth crosscut blades nearly burnished the end grain, with slightly less chipping on the face of the workpiece than combo blades. As blades dulled, however, crosscut blades proved more likely to burn.

LESSON 3: PLYWOOD CUTS CLEANER WITH A CROSSCUT BLADE

On oak-veneered plywood, crosscut edges chip easily because of the open grain of the thin veneer. New crosscut blades chipped out slightly less than combination blades on top of the cut, *above*. When dull, both blades' performance worsened, but proved about equal.

Underneath, we saw significant chip-out from the combo blades, even when new. The bottom of plywood trimmed with dull crosscut blades looks almost as clean as when the blades were new. (A zero-clearance insert likely would have reduced chip-out with all blades.)

The long and dusty road to Dullsville

We thought it would be easy to take the new edge off the saw blades used in the test, so we started dulling them by cutting medium-density fiberboard (MDF), which has a fairly high glue content. After running 65 linear feet of MDF through each blade, they still cut like new. So we stepped up our game, cutting 170 feet of melamine-coated particleboard with each blade. Still not dull enough. Finally, we cut more than 140 linear feet of laminate flooring—the toughest wood-based product we could find. That did the trick, dulling the blades enough to see a difference in performance.

Why do we bring this up? Two reasons: First, we're glad to make fewer trips to the sharpening shop, even with the low-cost blades—a credit to ever-improving blade technology. And, premium-priced blades seemed to hold up longer than low-cost blades: We had to run about twice as much flooring through the premium blades before they were as dull as the low-cost blades.

Our recommendation: Get two blades, not three

When sharp, combination blades performed as well as dedicated rip and crosscut blades. As the blades dulled, however, we started to see differences. So, if you work primarily in veneered plywood, a good crosscut blade will serve you well for both ripping and crosscutting those sheet goods. Switch to a sharp combination blade for solid stock.

But if you work in both solid woods and sheet goods, making rips and crosscuts, buy two identical combination blades instead. Install one in your tablesaw and set the other aside. At the first sign of dulling (burned edges and/or increased feed resistance), switch to the second blade and get the first blade cleaned and sharpened. That way, you'll always have a fresh blade ready for action.

shop tips

Helping you work faster, smarter, and safer

Keyhole bit unlocks the secret to no-slip bookends

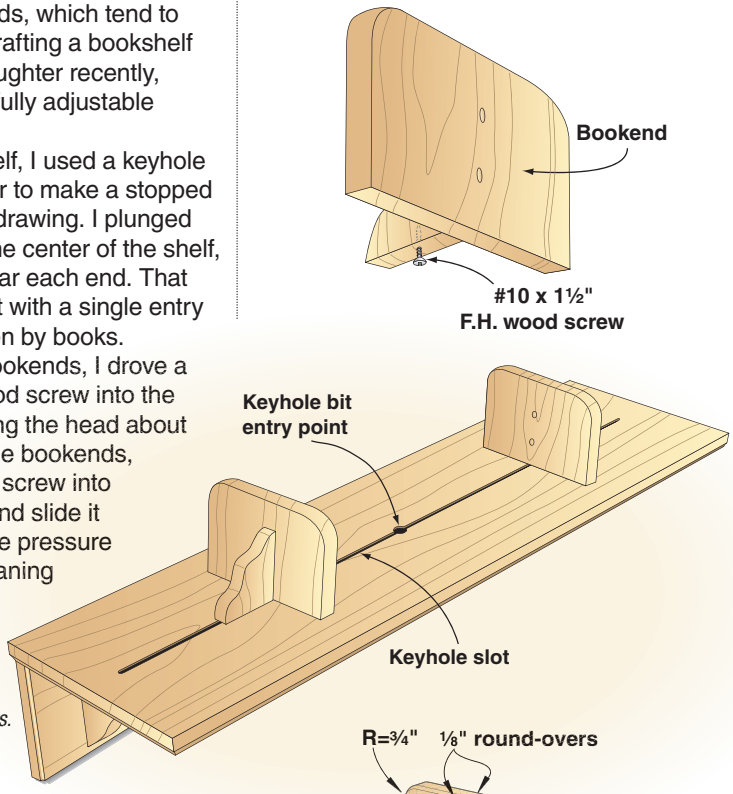
top shop tip

I've built many a bookshelf over the years and have always been frustrated by free-standing bookends, which tend to slip or tip. So, while crafting a bookshelf for my great-granddaughter recently, I hit upon the idea of fully adjustable built-in bookends.

In the top of the shelf, I used a keyhole bit in my plunge router to make a stopped slot, as shown in the drawing. I plunged the bit ½" deep into the center of the shelf, and then routed to near each end. That created a keyhole slot with a single entry hole that will be hidden by books.

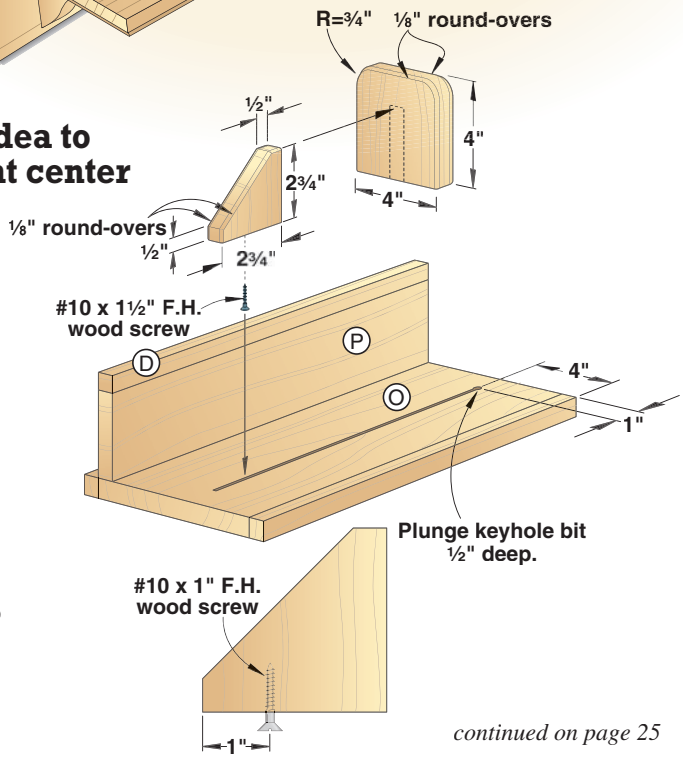
After making the bookends, I drove a #10×1½" flathead wood screw into the bottom of each, leaving the head about ¼" proud. To install the bookends, insert the head of the screw into one of the keyholes and slide it where you want it. The pressure from a book or two leaning against the bookends prevents them from sliding away.

—Gerald "Jum" Coorough, Prairie du Chien, Wis.



Adapting Jum's idea to the entertainment center

Jum's tip arrived too late for us to build it into the design of the Compact Entertainment Center project on page 42. But we think it's the perfect solution for keeping your CD and DVD collections from falling flat on their respective shelves. If you'd like to add "bookends" to that project, build them as shown in the drawing, at right, and add the keyhole slot in the shelves (O) where shown.



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Our Winner

Photo: Larry Knutson

After a lifetime of building furniture for his kids and grandkids, and "pretty much everything in our house," Gerald "Jum" Coorough now makes smaller projects for his family. One of those projects inspired his prizewinning Top Shop Tip at *left*. "They still try me for bigger stuff," Jum chuckles, "but I tell 'em no."

As his reward for sending this issue's Top Shop Tip, Jum Coorough receives a Jet 1,200-cfm, remote-controlled dust collector. Use it in good health, Jum!

Top tips win tools!

Describe how you've solved a workshop dilemma and you'll earn $75 if it appears here. And, if your tip garners Top Shop Tip honors, you'll also win a tool prize worth at least $250.

Send your best tips, along with photos or illustrations and your daytime phone number, to: **Shop Tips, WOOD Magazine, 1716 Locust St., GA-310, Des Moines, IA 50309-3023**. Or e-mail tips to: shoptips@woodmagazine.com. Remember to include your contact info in the e-mail as well.

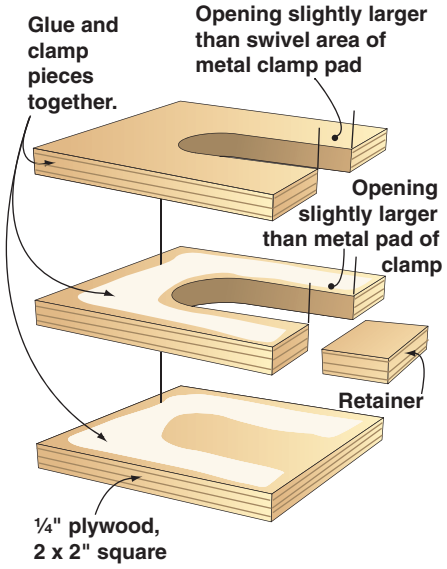
Because we try to publish original tips, please send your tips only to *WOOD* magazine. Sorry, submitted materials can't be returned.

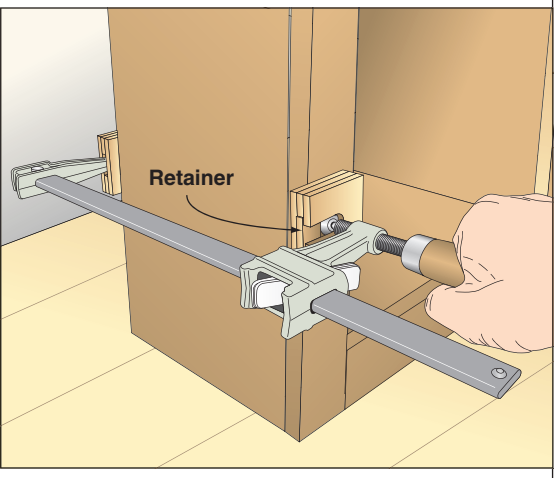
Keyhole pad takes the bite out of bar clamps

Most woodworkers know to insert a protective pad between the workpiece and the metal jaws of clamps to prevent marring. Unfortunately, it often seems like you need three hands to hold the pads in place and tighten the clamp. This keyhole pad design eliminates that challenge.

Start by cutting 2×2" squares from ¼" plywood. (Each pad requires three such squares.) Cut the U-shaped openings in two of the pads, as shown *below*. Glue the three layers together and clamp them with spring clamps. To hold the pad in place on the clamp, cut a retainer block to fit snugly in the larger opening. Tap it in to keep the pad in place; tap it out if you want to remove it.

—Bob Youngquist, Columbia, Mo.

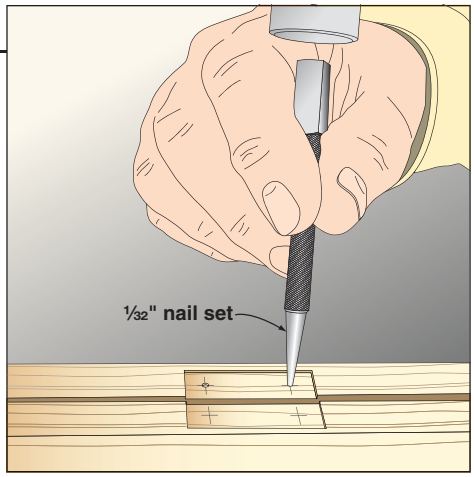




Centered screws depend on a good start

Many times when using an awl or a nail to mark a position for drilling a pilot hole, heavy grain in the wood causes the awl to veer off the desired mark. You can avoid this problem by using a 1/32" nail set and a small hammer to mark the hole locations. The concave tip of the nail set helps keep it aligned regardless of the wood's grain, making it easier to get the tip of the drill bit in exactly the right spot.

—Thomas Peters, Midland, Mich.



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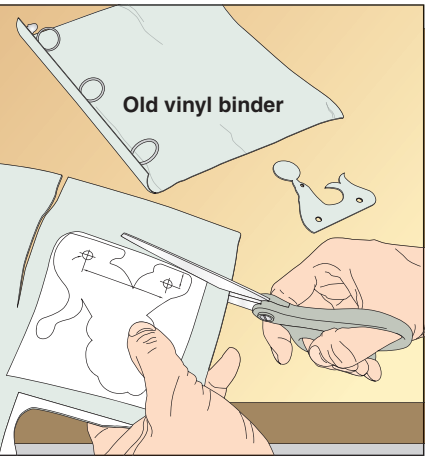


A study guide to durable patterns

While going through notebooks from my bygone school days, I realized that the heavy plastic binder covers make the perfect material for durable patterns and templates. The plastic is easily cut with either scissors or razor blades, the templates hold their shape well through wet/dry cycles, and the thickness and rigidity make them ideal for tracing patterns. And if you need a larger pattern, join several pieces with duct tape.

Besides plastic notebook covers, plastic signs, such as the type used for garage sales, also work well. When I have more than one template per project, I store the templates in a large manila envelope with the name of the project written across the front.

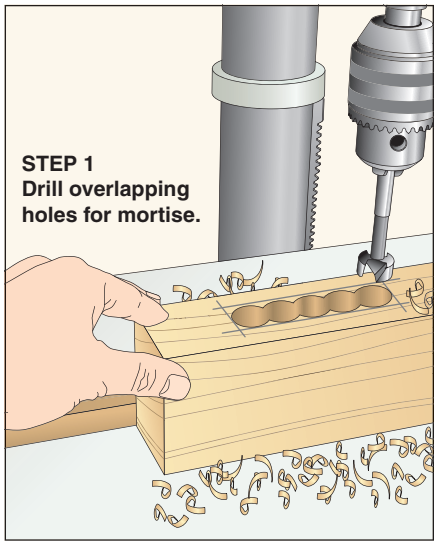
—Dustin Davis, Cumberland, Md.

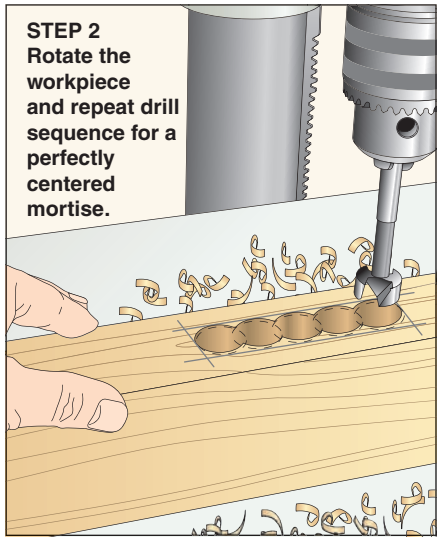
Cut twice for a perfectly centered mortise

Recently, I built a futon using plans from *WOOD*® magazine issue 86 (Feb. '96). However, when I cut the first mortises, I had a slight problem getting them centered perfectly. When assembling the leg to the rail, it required some sanding to get the joints flush.

I solved the problem by drilling the overlapping holes twice. After the first drilling operation, I turned the workpiece around to put the other face against the drill press fence. During the redrilling, the bit just shaved the other side of the mortise, leaving an equal reveal on both sides. Once I had the mortises cut and cleaned, I cut the tenons to fit the mortises and had very little trouble getting the joints to fit flush.

—Ernie Dennis, Goshen, N.H.



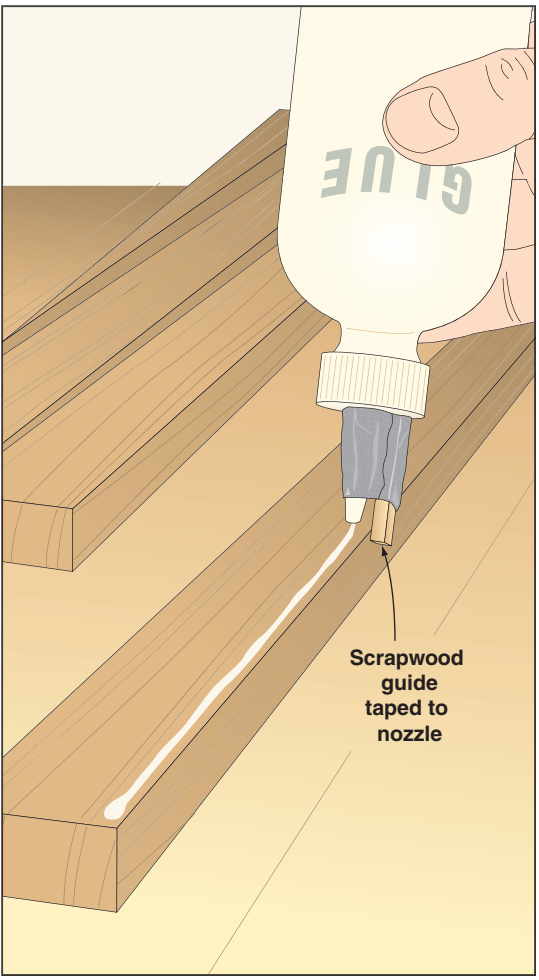


Pinstripe-perfect glue lines

I make stack-laminated baskets where each layer is slightly wider than the one below it, and I wanted to make sure I put glue only where it wouldn't be visible on the layer below. No matter how steady my hand is, I found it difficult to apply a straight glue line in this situation.

So, I taped a scrapwood guiding pin to the nose of my glue bottle, as shown. With the guide running along the edge of the workpiece, I get perfectly placed, arrow-straight glue lines with every application.

—Jerry Syfert, Naples, Fla.



See a new Shop Tip of the Day at **woodmagazine.com/tips**

the (almost) handcut dovetail lap joint

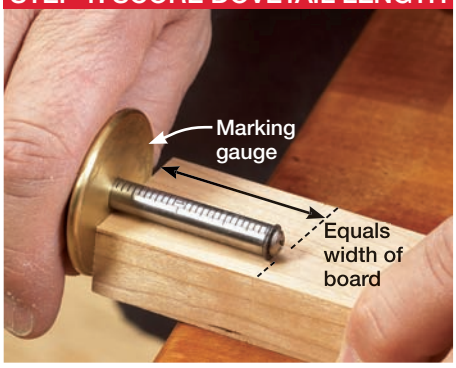
Simple, stylish, solid—this reinforcer dresses up everything from picture frames to cabinet face frames.

Some joints rely on power tools, and others on hand tools. Combine both to create this eye-catching bond that would sooner break wood than pull apart.

Hand tools you'll need include a marking gauge, sliding bevel, dovetail saw, chisels, crafts knife, and pencil. Power tools that'll make the job easier include a bandsaw and a router that can be used freehand or table-mounted with a straight bit.

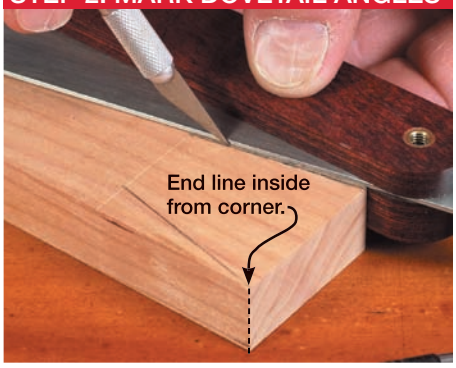
First, form the crisp, clean dovetails

STEP 1: SCORE DOVETAIL LENGTH



Machine your frame parts to identical width and thickness, in this case ¾" thick and 2" wide. Set your marking gauge to the width of the stock, and scribe lines on both faces and edges of each end where you'll cut dovetails.

STEP 2: MARK DOVETAIL ANGLES

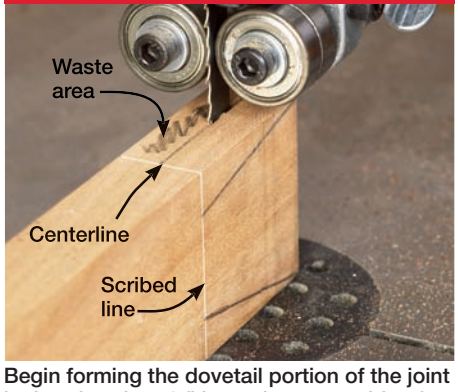


Now, set your sliding bevel to an 81° angle. Scribe lines to make the dovetail's wide end 1/32" narrower than the width of the workpiece. This provides a flat surface on the end for starting your saw cut.

STEP 3: MARK THE CENTERLINES

Set your marking gauge for the center of the stock, and scribe lines along edges and ends where you'll cut each dovetail. Measure from the appearance (face) side down for added consistency. Lightly darken the line with a pencil and shade the waste areas.

STEP 4: CUT THE DOVETAIL DEPTH



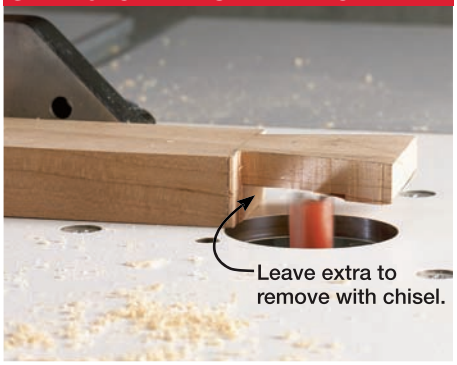
Begin forming the dovetail portion of the joint by bandsawing 1/32" in on the waste side of the center line. Stop 1/32" from the line you scribed in Step 1. You also can use a Western- or Japanese-style dovetail saw to saw off the waste.

STEP 5: ROUGH-CUT THE DOVETAIL

Bandsaw on the waste side of your dovetail marks. Stop about 1/32" before the scribed line marked on the shoulder. Then saw in from the edge to form the rough shoulder. Complete this step using a handheld saw for a true handcut joint.

continued on page 30

STEP 6: CLEAN UP THE DOVETAIL



Use a table-mounted router and straight bit to remove waste on the underside of the dovetail up to the end centerline. Use a miter gauge or fence to help control your workpiece.

STEP 7: CLEAN UP THE EDGES

Using the flat back of the chisel, shave away the surplus area left in Steps 5 and 6. Create straight lines with edges that are at right angles to the surfaces.

STEP 8: DEFINE THE SHOULDERS

Shave the shoulders flush with the line scored in Step 1. Remove the surplus on the underside of the dovetail left after Step 6 to the same scored line.

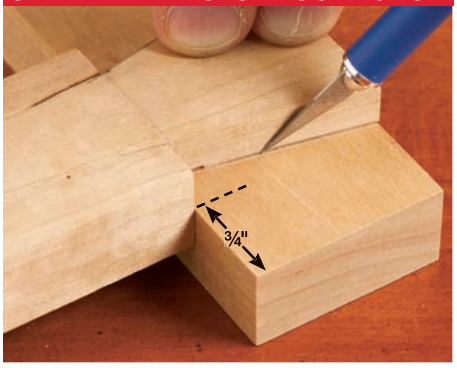
Now cut the slots

For this example, we'll position the edge of the dovetail piece ¾" in from the end of the dovetail slot workpiece, as shown in Step 1. Inserting the slot reduces the risk of breaking off the small area between the edge of the dovetail and the end of the board. It also supports your router base, as shown in Step 4.

If your project requires a frame with flush edges and ends, cut the slots on oversize pieces and trim away the excess on the ends after cutting and cleaning up the slots. For tight-fitting joints, trim away the excess after the joint is assembled and glued.

The dovetails you cut in the previous stage serve as guides for marking angles on the slot workpieces. So on projects using more than one joint, number or letter the dovetails and matching slots.

STEP 1: MARK SLOT LOCATIONS



Hold the dovetail firmly against the top of the slot workpiece, and use a crafts knife along the edge of the dovetail to score lines for cutting the slots.

STEP 2: MARK SLOT CENTERLINES

Using your marking gauge, scribe centered lines on both edges of the dovetail slot workpieces where cuts will be made. Again, measure down from the appearance side.

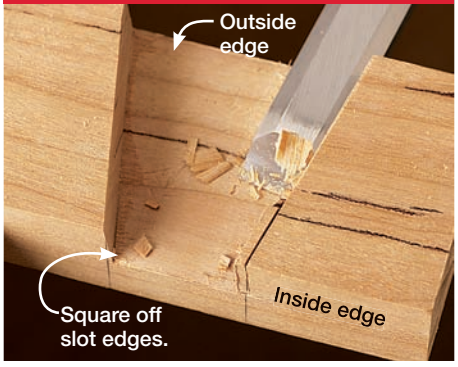
STEP 3: CUT THE SLOT SIDES

Now, cut down to the scribed center lines using a Western- or Japanese-style dovetail saw. Cuts must be perpendicular to the face for a gap-free fit.

STEP 4: FLATTEN THE SLOT

Use a straight bit in a handheld router to flatten the bottom of the slot down to your centerline. Leave a small amount to remove with a chisel to avoid damaging your straight-sawn edges. Use scrap as thick as your stock to stabilize the router base.

STEP 5: CLEAN UP THE SLOT



Remove the surplus left after routing. If necessary, square off the inside and outside edge lines and correct any sawn sides of the slot that aren't square. Test-fit the joint, as shown *opposite top*, until the pieces assemble without excessive force.

STEP 6: FLUSH-SAND PIECES

Spread glue evenly on the underside and edges of the dovetail, seat it in the slot, and clamp it in place. After the glue dries thoroughly, flush-sand the faces and edge of the joint up to 150 grit using a random-orbit sander.

shop-proven products

These woodworking wares passed our shop trials.

SawStop cabinet saw: Just what the doctor ordered

It's been five years since the SawStop tablesaw blade brake created an industry-wide stir at the International Woodworking Fair in Atlanta. The inventor's dream has now become reality, as tablesaws equipped with the device are finally on the market. We've been using a SawStop cabinet-style tablesaw in the *WOOD*® magazine shop since last November, and so far the machine has met or passed our expectations for cutting performance and safety.

If you're not already familiar with SawStop, here's the nutshell look: A spring-loaded, solid-aluminum brake pawl (see photo *below*) quietly waits beneath the tabletop, about ⅛" from the blade's teeth. If your skin touches any part of the blade while it's turning, electronic circuitry detects the touch and releases the brake pawl into the teeth, stopping the blade almost instantly. That sudden stop—and the blade dropping below the tabletop at the same time—turns a potential amputation into a much-less-serious injury.

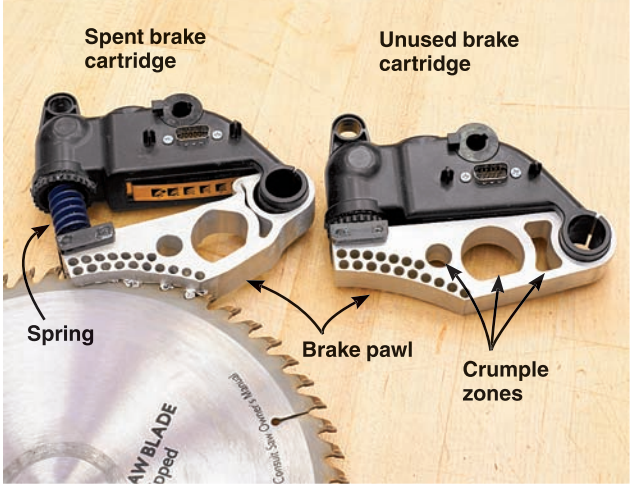
We test-fired SawStop a number of times (using an all-meat wiener as a finger substitute) to simulate likely blade-contact situations: fed straight into the blade; thumped on the top of the blade to replicate kickback, and dragged across the top of the blade. (You can view video of some of our tests and the results on our Web site at woodmagazine.com/sawstop.) As you can see from the photo, *below right*, in some cases the skin of the wiener was barely nicked. In others, the frank suffered some damage that might still require a trip to the emergency room, but not an amputation.

But what about false firings? Air- or kiln-dried woods don't conduct electricity like flesh, and in more than six months of daily use, SawStop's blade brake only fired once when we didn't expect it. We ran dripping-wet pressure-treated lumber through the blade and that triggered the brake. The next time we cut wet wood or conductive materials, such as brass and aluminum, we tested the material by first touching it to the blade with the saw turned off. Diagnostic lights on the power switch told us that cutting the material would trigger the brake, so we had to temporarily override the safety system, using the "bypass" key switch.

When you change from a blade to a dado set, you must also swap the standard brake cartridge for a dado cartridge. (This keeps the brake pawl in close proximity to the

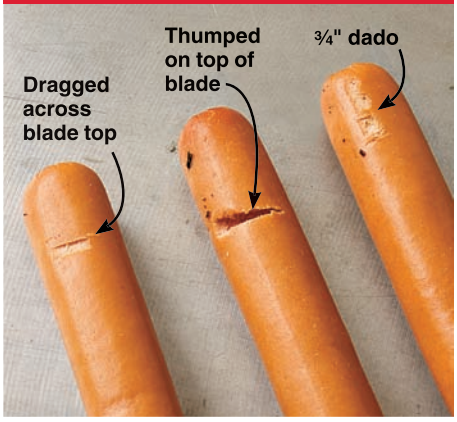
Continued on page 34

THOSE ARE THE BRAKES



"Crumple zones" built into SawStop's aluminum brake pawl help it absorb the impact of a tablesaw blade spinning at 4,000 rpm. Heat created by the impact fuses the blade to the brake, requiring replacement of both.

TEST CUTS: DOG TALES



SawStop's braking system halted the blade fast enough to limit injury to these surrogate "fingers." Most surprising to us was the light damage from a ¾" dado set (far right).

edge of the smaller-diameter dado set.) At first, this changeover proved to be a nuisance, but before long, we found we could change to a dado set or back in less than 90 seconds, start to finish.

The blade brake is a great safety device, but SawStop's European-style riving knife (shown at *right*) adds another layer of safety. Acting as a splitter, it prevents kickback; standing just shy of the blade height, it helps in keeping you from accidentally dragging your hand into the back of the blade. And the riving knife installs in place of the splitter/blade guard with a flick of a lever. Our riving knife comes off only for dado cuts and then goes right back on the saw afterward—a testament to how much we like it.

All those safety devices would mean little if the SawStop cabinet saw was underpowered or poorly built. But that's not the case. Fit and finish on this machine is above average, with massive, smooth-operating handwheels and nicely machined tables. We also appreciate the oversize blade-changing wrenches that keep our hands well clear of the blade.

RIVING KNIFE: ANOTHER SAFETY FEATURE

The riving knife raises and lowers with the saw blade, always remaining just a hair lower than the top of the blade. That means it won't interfere with a sacrificial pushblock when ripping narrow stock, for example.

About the time this issue went to press, SawStop began selling a contractor-style saw equipped with the blade brake, riving knife, and a 1½-hp motor, for $800. That price includes stamped-steel extension wings and a 30" fence system.

—Tested by Chuck Hedlund, Jeff Mertz, and Kevin Boyle

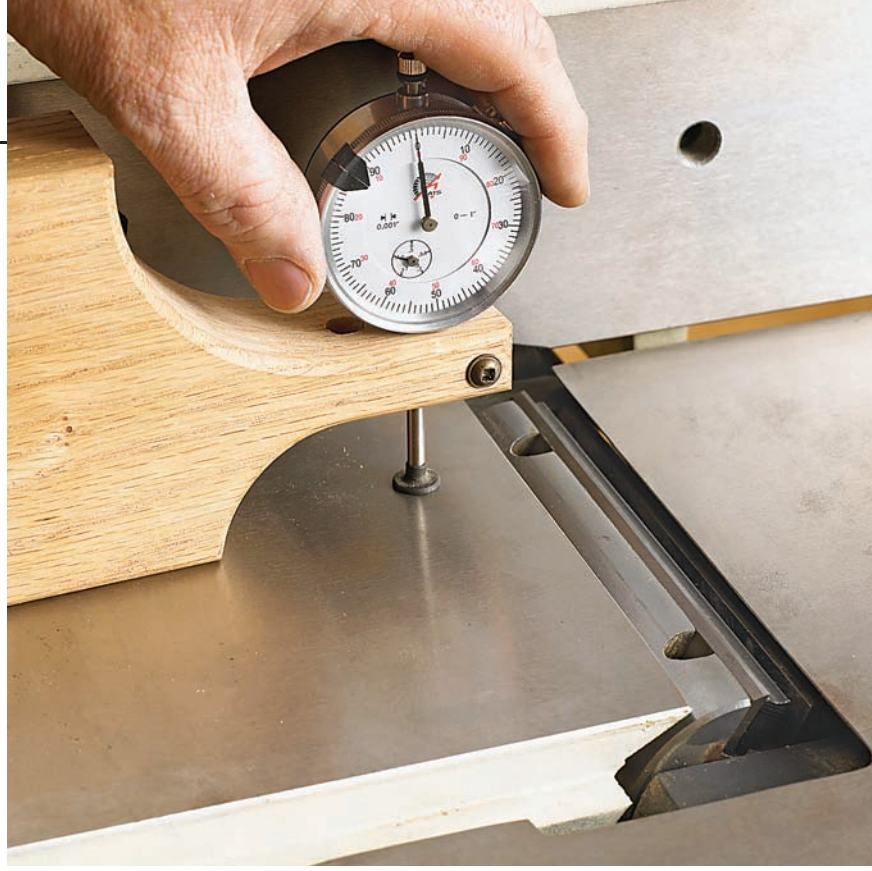
SawStop 10" Cabinet Saw (3 hp)

Performance	★★★★★
Price	$2,500, without a rip fence (add $290 for 36" fence; $330 for 52" fence); $60, replacement blade brake cartridge; $70, replacement dado brake cartridge

SawStop
503/638-6201; sawstop.com

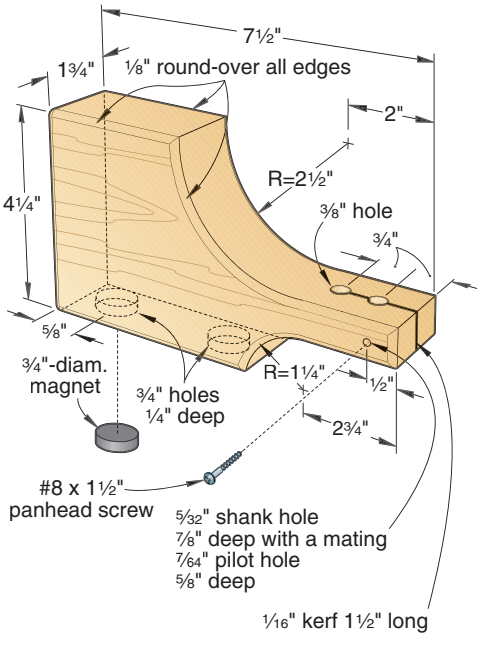
zero-in perfection: adjusting jointer knives

Aligning jointer knives doesn't have to be difficult. Using an inexpensive dial indicator, a shop-made holder, and these six simple steps, you can achieve perfection in under 30 minutes.



Adjusting jointer knives is a shop task often misunderstood and too often neglected. This doesn't have to be the case. Many methods and jigs exist (some very involved and others quite expensive) to help you set jointer knives. Like most woodworkers, you probably don't want to spend a lot of time or money on tool maintenance. If your jointer's cutterhead has jackscrews here's how to get the job done in no time with an inexpensive dial indicator (less than $20) and a shop-made holder. Begin by making the holder (*lower left*), and then follow these steps.

DIAL INDICATOR HOLDER



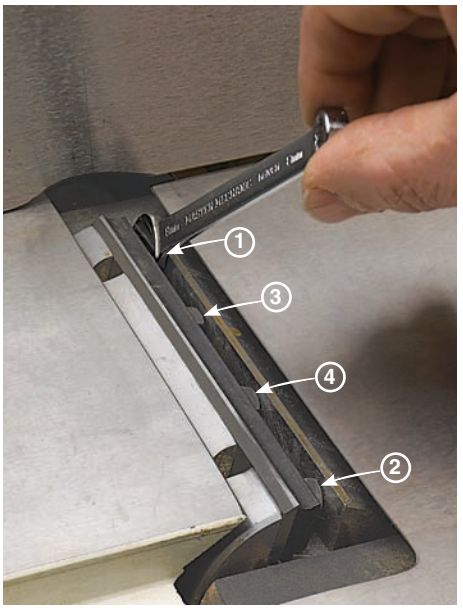
Step 1 With the tool unplugged and the knives removed, clean all dust and debris from them, the gibs, and the cutterhead slots. Lightly coat the parts with a light machine oil to help make adjustments easier and to keep parts from freezing together. If the knives need sharpening, take them to a professional. Note: during tool start-up, any excess oil will quickly fly off the cutterhead and not contaminate your work.

Step 2 Place the knives in the cutterhead, making sure they sit below the outfeed table height. Snug the gib bolts to hold the knives in place. Do not tighten yet.

Step 3 With the dial indicator mounted in the holder (as shown in the *top* photo) and positioned over the outfeed table, turn the dial's outer ring until it reads zero.

Step 4 Position the dial indicator foot over the knife, centering it on the cutting edge. The dial should read less than zero. Note: A flat foot on the dial indicator makes locating the edge center easier, but an indicator's bullet tip also works.

Step 5 Using an Allen wrench and the jackscrews in the cutterhead, raise the knife until the dial reads zero along the entire length. Tweak each end of the knife to reach the desired height.



Step 6 Gradually tighten the gib bolts in the sequence shown so the knife won't creep upward and need readjusting. Recheck the knife height, and repeat Steps 5 and 6 on the remaining knives. Check all bolts and guards before turning on the jointer.

Illustrations: **Roxanne LeMoine**

easy-adjust router trammel

Cut perfect circles from 15" to 48" in diameter with this shop-made accessory.

Say goodbye to rough and irregular edges the next time you cut a circle or ring. And, using the trammel's extended base for added stability, as shown at *right,* you can detail an edge or rabbet the back of a cabinet without fear of the router tipping.

How to build your own

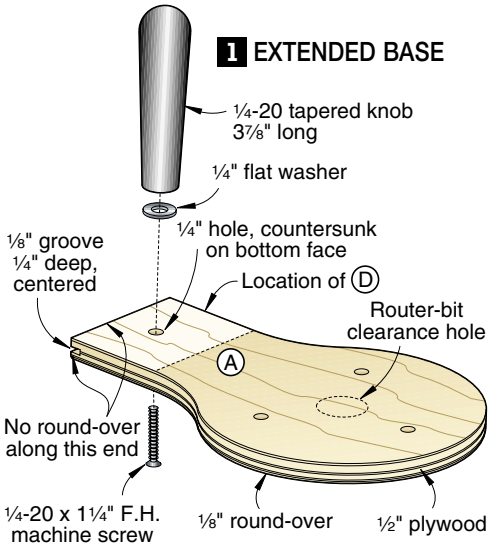
1 Cut a piece of ½" Baltic birch plywood to 6×9¼" for the extended base (A). Cut a centered ⅛" groove ¼" deep along one end, where shown on **Drawing 1** and the full-size base pattern on the *WOOD Patterns®* insert. Use a table-mounted router with a slot cutter or a tablesaw with a zero-clearance insert to cut the groove.

2 Spray-adhere the full-size base pattern onto the blank, aligning the ⅛" groove with the groove location marked on the pattern. Bandsaw and sand the extended base (A) to shape.

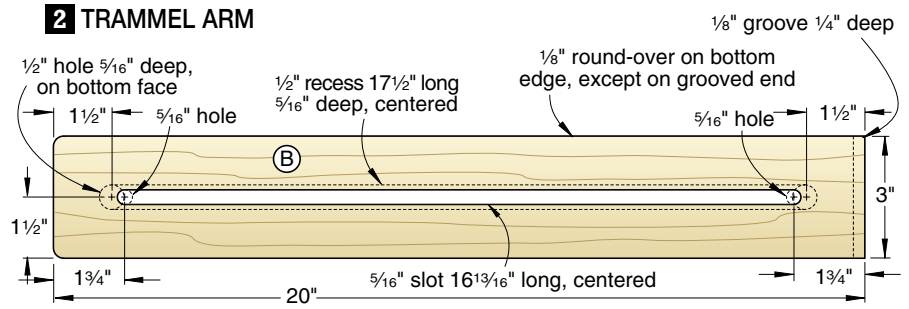
3 Remove the baseplate from your router and position the plate on the paper pattern adhered to the extended base. Align the baseplate holes with the centering lines on the pattern. Mark the screw-hole centerpoints, as shown in **Photo A**. Trace the router-bit clearance hole onto the extended base.

4 Drill and countersink the marked holes for attaching the extended base to the router. Then drill or scrollsaw the router-bit clearance hole.

5 Rout a ⅛" round-over along the bottom edge of the extended base where shown. Note: *Do not round over the end of the base with the groove.*



Transfer the screw-hole locations from your router baseplate onto the extended base, positioning them over the centering lines.



Form the trammel arm

1 From ½" Baltic birch plywood, cut a piece to 3×20" for the trammel arm (B). Cut a centered ⅛" groove ¼" deep along one end of the arm, where shown on **Drawing 2**.

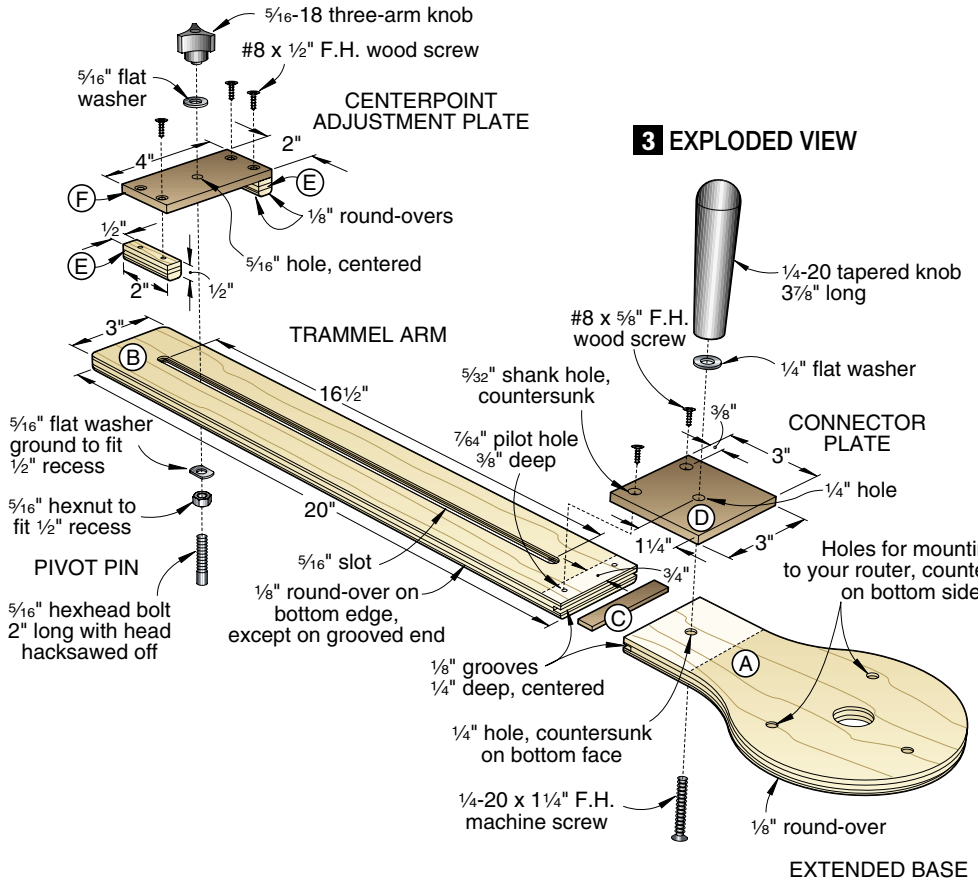
2 On the *top* face of the arm, mark the centerpoints, and drill a pair of 5⁄16" holes through the arm, where dimensioned on **Drawing 2**. Connect the hole perimeters for the slot (to be cut later) with a straightedge and pencil.

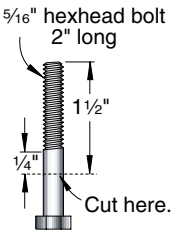
3 On the *bottom* face of the trammel arm (B), use a Forstner bit to drill a ½" hole 5⁄16" deep, where shown on **Drawing 2**.

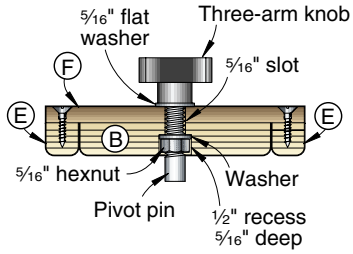
4 To form the trammel-arm recess, install a ½" straight bit into your table-mounted router. Raise the bit 5⁄16" above the surface of the table. Position the fence so the bit centers over the ½" hole drilled in the previous step. Mark start and stop reference lines 1½" from the center of the straight bit on the router fence.

5 Bring the trammel arm (B) up to the left start mark on the router fence, and slowly lower it onto the bit, as shown in **Photo B**.

continued on page 40



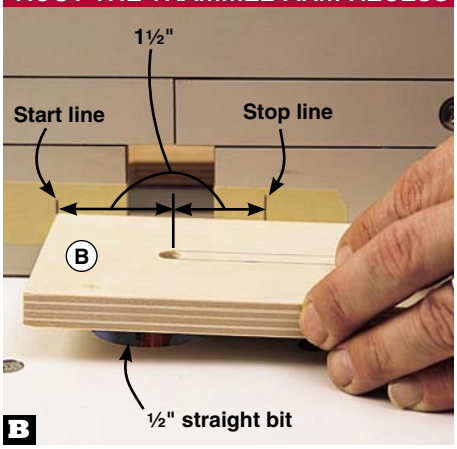




Carefully rout a 5/16"-deep recess until the trailing end reaches the right stop mark on the fence. Lift the trammel arm off the bit.

6 Scrollsaw the 5/16"-wide slot previously marked on the *top* face of the trammel arm (B). Rout a 1/8" round-over along the bottom edges of the trammel arm *except* on the grooved end, where indicated on **Drawing 2**.

ROUT THE TRAMMEL-ARM RECESS



B

Align the end of the trammel arm (B) with the start line on the router fence and carefully lower it onto the straight bit. Rout the access until the trailing end reaches the stop line.

Join the extended base to the trammel arm

1 From 1/8" hardboard, cut the spline (C) to size. Glue the spline into the grooved end of the trammel arm.

2 Cut the connector plate (D) to size from 1/4" hardboard. Drill the two countersunk mounting holes and glue and screw the connector plate to the trammel arm (B), where shown on **Drawing 3**. Slide the extended base (A) over the spline (C) in the trammel arm. Drill and countersink the 1/4" hole through the base and connector plate for the knob machine screw, where indicated on the extended base pattern. This ensures hole alignment and a tight fit between the two pieces.

Add the centerpoint adjustment plate

1 Cut the adjustment plate pieces E and F to size. Drill the holes shown on **Drawing 3**. Screw the three pieces together.

2 Grind opposite edges off a 2" long 5/16" flat washer so it fits into the 1/2"-wide trammel-arm recess. Hacksaw the head off a 5/16" hexhead bolt, where shown on **Drawing 3a**. Thread a 5/16" hexnut onto the bolt. Assemble the adjustment plate to the trammel arm (B) in the configuration shown on **Drawing 3b**.

Putting the trammel to work

Using trammel points or a large compass, mark the centerpoint and required radius on your workpiece. Cut the workpiece about 1/8" oversize with a handheld jigsaw. This leaves less material to rout and improves the quality of the cut. At the previously marked centerpoint drill a 5/16" hole 3/8" deep. Position the centerpoint adjustment plate with attached pivot pin until the distance from the *inside* cutting edge of the straight bit to the center of the pivot pin equals the desired radius of the circle. Drop the pivot pin into the centered hole and begin routing in a counterclockwise direction, as shown at the top of the *previous page*.

Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lora Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	extended base	1/2"	6"	9 1/4"	Ply	1
B	trammel arm	1/2"	3"	20"	Ply	1
C	spline	1/8"	1/2"	3"	HB	1
D	connector plate	1/4"	3"	3"	HB	1
E	guide bars	1/2"	1/2"	2"	Ply	2
F	centerpoint adjustment plate	1/4"	2"	4"	HB	1

Materials key: Ply–plywood, HB–hardboard.

Supplies: Spray adhesive, #8x5/8" flathead wood screws (2), #8x1/2" flathead wood screws (4), 1/4-20x1 1/4" flathead machine screw, 1/4" flat washer, 1/4-20 tapered knob, 5/16" hexhead bolt 2" long with nut, 5/16" flat washers (2), 5/16-18 three-arm knob.

Bits: 1/8" round-over, 1/2" straight router bits; 1/2" Forstner bit.

COVER PROJECT

compact entertainment center

Deep, dual-shelf drawers with full-extension slides hold loads of easily accessible media.

A back with roller catches literally unlatches in a snap for easy and organized wiring connections.

Looking for a space-saving cabinet to hold your TV, electronic components, videos, and CDs? Let this handsome unit, made from red oak and red oak plywood, steal the show. Though it measures only 23¾" deep × 44" long × 26" high, it has spacious drawers that hold a total of about 110 DVDs or 70 videotapes, and a glass-door enclosed area with adjustable shelves for components. The entertainment center accepts TVs up to 42" wide and 23" deep. Need even more storage for your videos and CDs? Check out the companion media storage cabinet, presented in issue 160, or go to woodmagazine.com/mediastorage.

Start with the easy-to-make biscuit-joined base

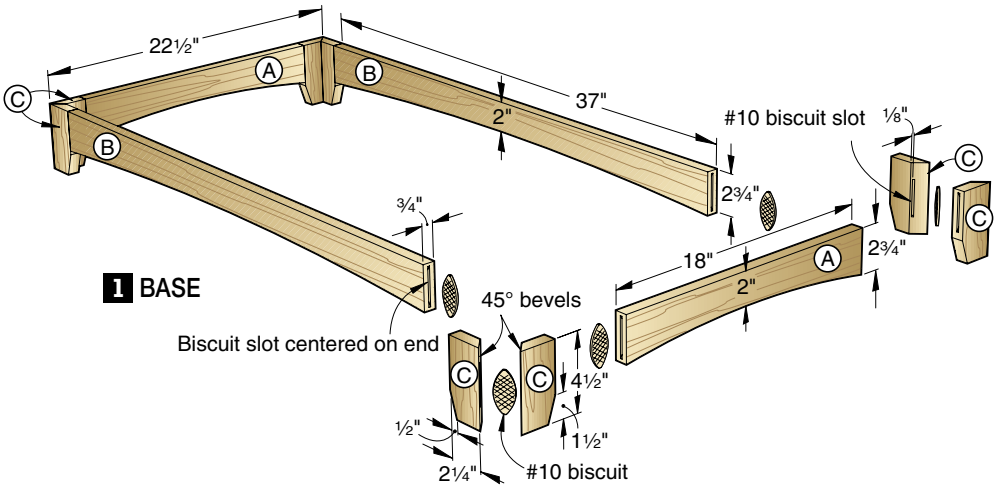
1 From ¾"-thick stock (we used red oak), cut the side rails (A) and front/back rails (B) to the sizes listed in the **Materials List**. Draw the curves on the rails, where dimensioned on **Drawing 1**, using a fairing stick. (For a simple and free fairing stick plan, go to woodmagazine.com/fairing.) Bandsaw and sand the curves smooth.

2 To form the foot halves (C), cut from ¾"-thick stock two 2½×22" blanks. Angle your tablesaw blade 45°. Then bevel-rip one edge of each blank to the finished foot width of 2¼". Now crosscut four 4½"-long foot halves from each blank.

3 Make four copies each of the full-size left and right foot-half patterns from the *WOOD Patterns®* insert. Spray-adhere the patterns to the foot halves, making sure you align the noted pattern edge with the beveled edge on each piece. Then bandsaw and sand the angled side on each piece to the pattern line.

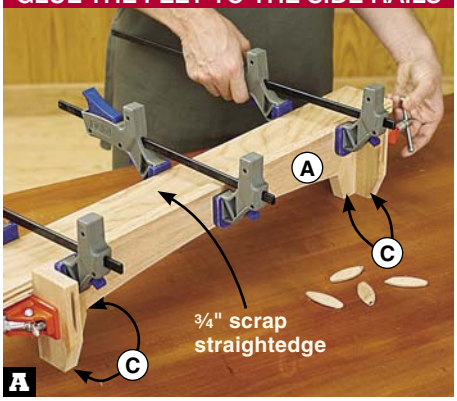
4 Using your biscuit joiner, plunge slots for #10 biscuits in the foot halves (C), where shown on the patterns, and in the ends of the rails (A, B), where shown on **Drawing 1**. When cutting the slots in the beveled edges of the foot halves, angle your biscuit-joiner fence to 45° and adjust the height to position the slot cutter ⅛" from the *inside* faces of the foot halves. This will prevent the cutter from going through the outside faces. Remove the patterns from the foot halves using a cloth moistened with paint thinner.

5 Glue, biscuit, and assemble the beveled edges of the mating left and right foot halves together, keeping the ends flush and the joints tight. After the glue dries, assemble the feet to the ends of the side rails (A) with biscuits, using ¾" scrap as a straightedge to keep the outside faces of the feet and rails flush, as shown in **Photo A**. Now assemble the side rail/feet assemblies to the front/back rails (B) to complete the base, again using straightedges to keep the parts aligned and the base square. Sand the base to 220 grit, and set it aside.



1 BASE

GLUE THE FEET TO THE SIDE RAILS



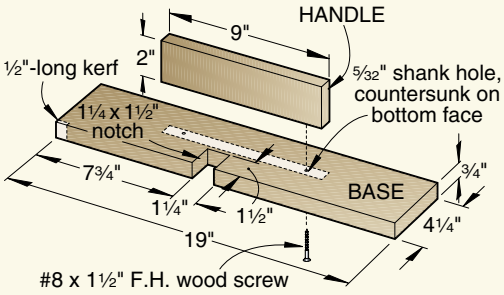
Glue, biscuit, and clamp the feet (C) to the ends of the side rails (A). Use ¾" scrap as a straightedge to keep the parts aligned.

SHOP TIP

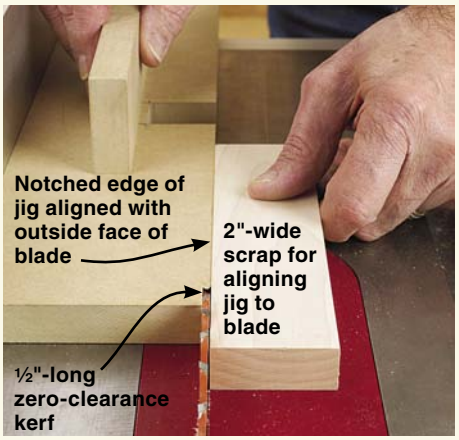
A simple jig makes it easy to flush-trim edging ends

Ever tried to trim edging flush with an end or edge of a plywood panel and accidentally cut into the panel? With the jig shown *below*, you'll quickly trim all of the entertainment center edging perfectly flush, eliminating alignment guesswork and miscuts.

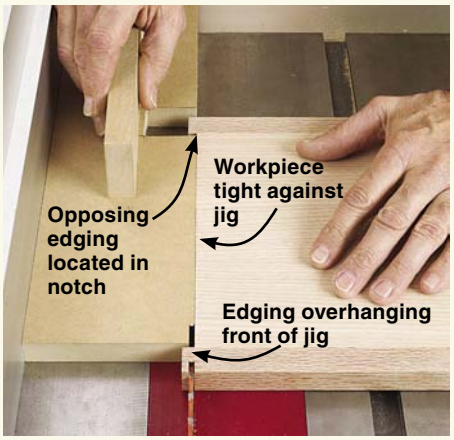
EDGING FLUSH-TRIMMING JIG



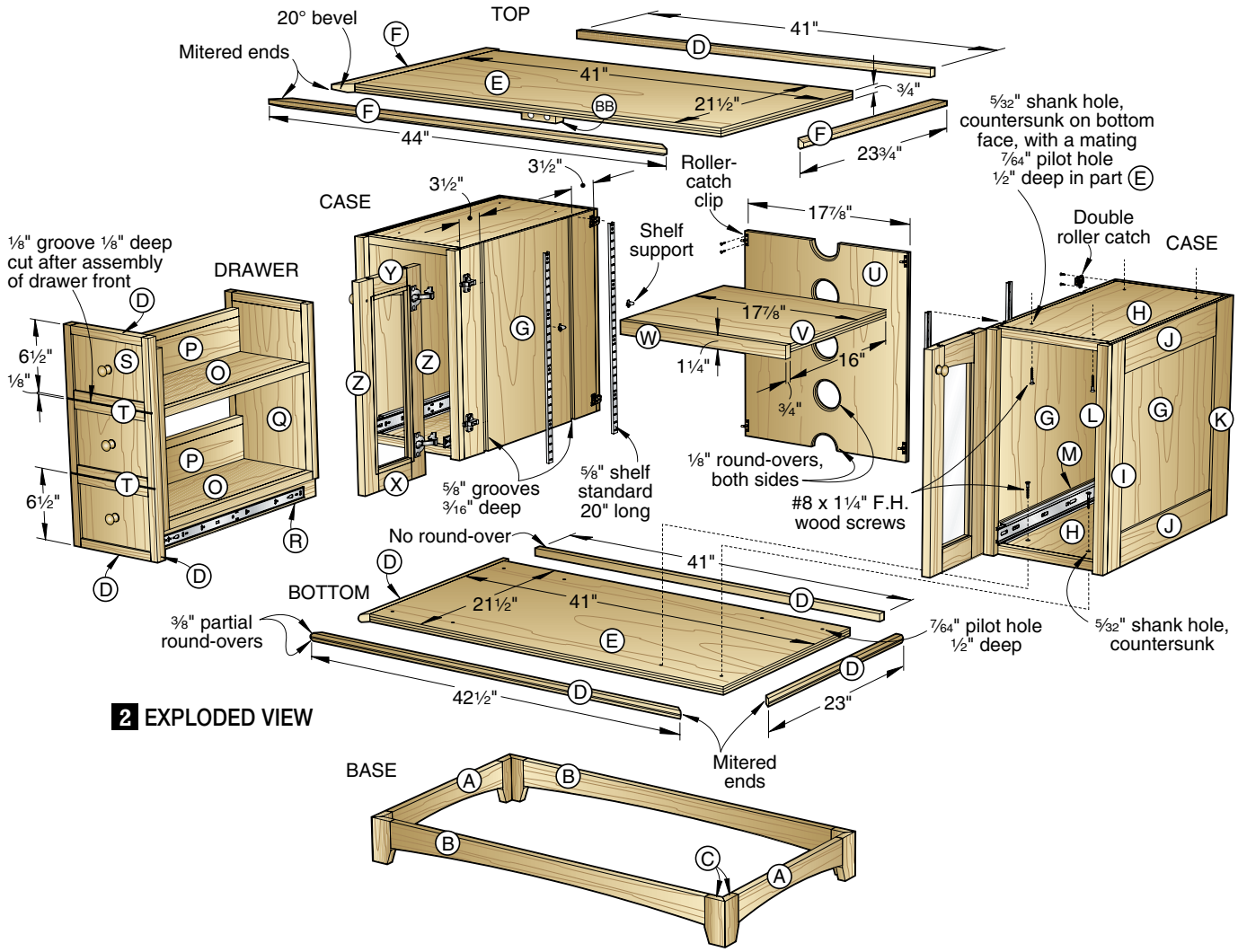
Step 1: Make the jig from ¾"-thick scrap, cutting the 1¼×1½" notch in the base, where dimensioned. (You'll cut the ½"-long kerf in the base in the next step.) Note that for other projects, you may need to change the location of the notch and length of the jig, depending on the sizes of the panels.



Step 2: With the saw off, position your tablesaw fence to align the notched edge of the jig with the outside face of the blade. To verify precise alignment, hold a 2"-wide piece of ¾" scrap against the jig, extending the front end by about 1". Cut a ½"-long kerf in the jig, as shown. Examine the edge of the 2"-wide scrap, and make sure you don't see any saw marks. If you do, adjust the fence, and test again.

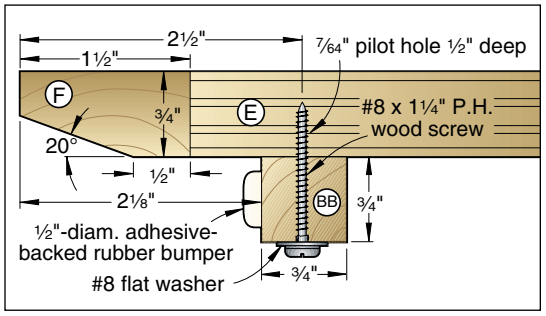


Step 3: Place your workpiece tight against the jig with the edging pieces overhanging the front end and extending into the notch, as shown. (For panels measuring more than 19" in width or length, let the edging overhang both ends of the jig.) Flush-trim the front edging, stopping when the blade enters the clearance kerf. (To maintain proper workpiece support, do not cut deeper into the kerf.) Now flip the panel and trim the opposing edging.

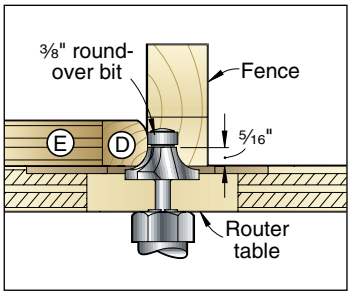


2 EXPLODED VIEW

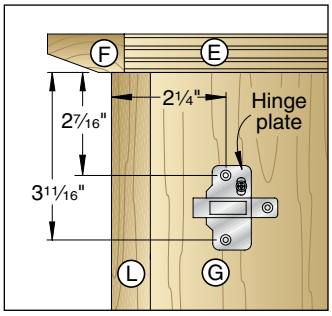
2a TOP/DOORSTOP DETAIL



2b ROUTING THE PARTIAL ROUND-OVERS



2c HINGE PLATE DETAIL



Next up: the edging blanks and top/bottom panels

1 From ¾"-thick stock, rip nine ¾×96" pieces for the edging blanks (D).

Note: *Many of the plywood panels for the entertainment center have edging. Save considerable time by preparing the edging blanks now and crosscutting them to the needed lengths as you build the project.*

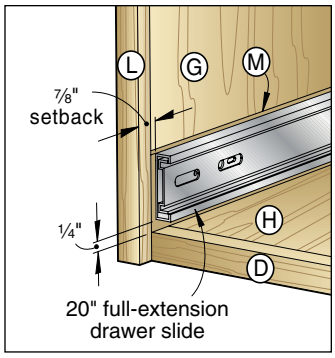
2 From ¾" red oak plywood, cut the top/bottom panels (E) to 21½×41". Then, from the edging blanks (D), crosscut pieces to the lengths shown on **Drawing 2** plus ½" for the back edge of *both* panels and the front edge and ends of the *bottom* panel, noting the mitered front corners. (Cutting all edging ½" longer than the finished lengths allows you to trim the pieces to exact lengths for flush ends and tight miter joints.)

3 Glue and clamp the edging, centered, to the back edges of both panels. After the glue dries, trim the edging flush with the plywood ends. For an easy way to do this, see the **Shop Tip,** *page 43*. Then glue and clamp the edging to the front edge and ends of the bottom panel, verifying tight mitered front corners. Again, after the glue dries, trim the end edging flush with the back edging.

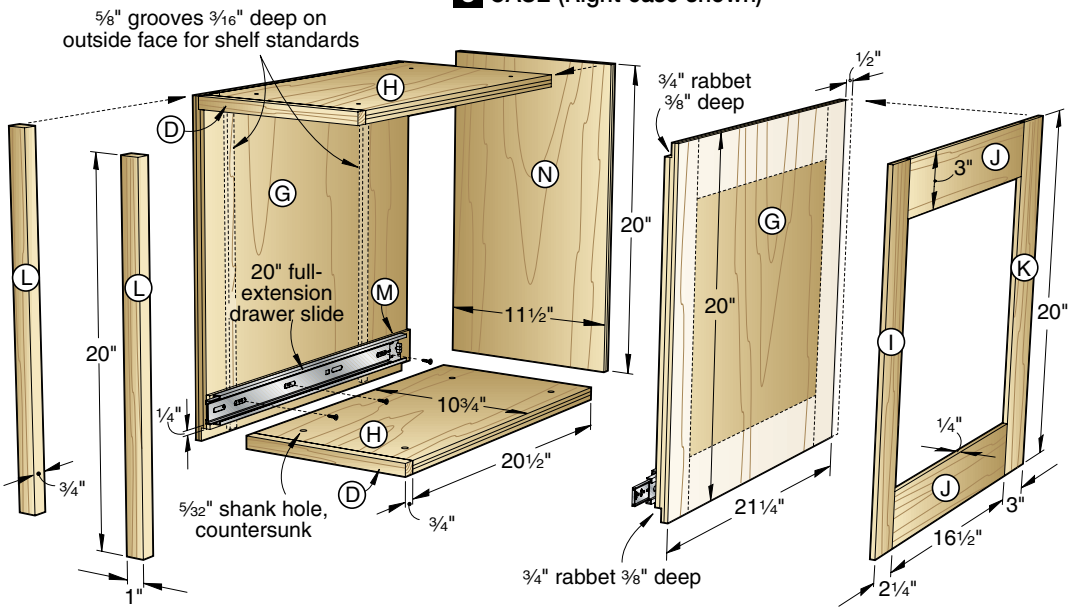
4 From ¾"-thick stock, cut the top-panel trim blank (F) to the size listed. Then bevel-rip the bottom face of the blank at 20°, where dimensioned on **Drawing 2a**. Sand the bevel smooth.

5 Crossut pieces from the trim blank to the lengths shown on **Drawing 2** (plus ½") to fit the ends and front edge of the top panel (E), again noting the mitered front corners. Using the same process as for the edging (D), apply the trim to the panel, and cut the end trim flush with the back edging. Then sand the edging and trim on the top and bottom panels flush with the plywood faces.

3a DRAWER SLIDE DETAIL



3 CASE (Right case shown)



6 To form ⅜" partial round-overs on the bottom panel edging (D), where shown on **Drawings 2** and **2b**, chuck a ⅜" round-over bit in your table-mounted router. Round over the top and bottom edges of the side and then the front edging.

7 Position the bottom panel (D/E) on a flat surface with the bottom face up. Then glue and clamp the base assembly (A/B/C) to the panel, flush with the back of the rear edging (D) and centered side-to-side.

Build and mount the cases to the panels

1 From ¾" oak plywood, cut the sides (G) and tops/bottoms (H) for the two cases to the sizes listed. From an edging blank (D), crosscut four pieces to the lengths needed for the front edges of the tops/bottoms (H), where shown on **Drawing 3**. As before, apply, trim, and sand the edging.

2 Fit your tablesaw with a ¾" dado blade. Then cut a ⅜"-deep rabbet along the top and bottom edges of the sides (G) on the *inside* face, where shown. Switch to a ⅝" dado blade. Now, on the *outside* face of the two *inner* sides (G), cut two 3/16"-deep grooves for ⅝" shelf standards, where dimensioned on **Drawing 2**.

3 Glue and clamp the sides (G) and tops/bottoms (D/H) together to form the cases, making sure the edging (D) on the tops and bottoms faces the front and the grooves for shelf standards in the two inner side panels face out. Check for square.

4 From ¾"-thick stock resawn or planed to ¼" thick, cut the side front trim (I), side top/bottom trim (J), and side rear trim (K) to the sizes listed. Glue and clamp the side front trim (I) to the outer sides (G), where shown on **Drawing 3**, flush with the front edges. Next, glue and clamp the side top/bottom trim (J) in position, tight against the front trim and flush with the ends of the sides. Now glue and clamp the side rear trim (K) in place, as shown in **Photo B**. Identify the left and right cases.

5 To determine the exact width of the front trim (L), measure the combined thickness of a side (G) and side front trim (I). (Ours measured 1/32" shy of 1".) Then, from ¾"-thick stock, cut the four front trim pieces to the measured width and 20" long. Now glue and clamp the trim to the front of each case, where shown on **Drawings 2** and **3**, keeping the outer edges and ends flush.

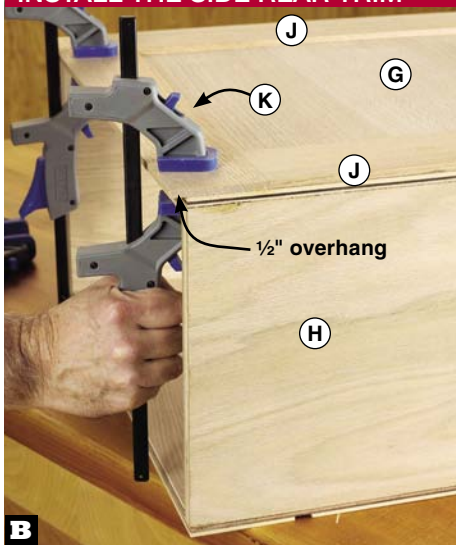
6 From ¾"-thick stock resawn or planed to ¼" thick, cut the two drawer-slide spacers (M) to the size listed. Then glue and clamp the spacers to the inside face of the *inner* sides (G), flush with the bottoms (D/H) and tight against the front trim (L).

7 From ½" oak plywood, cut the backs (N) to size to fit the cases. The backs fit against the case edges and tight against the ½" overhang of the side rear trim (K). Set the backs aside.

8 Place the base/bottom panel assembly (A/B/C/D/E) on a flat work surface with the panel up. Using two ¾×4×18" spacers between the cases, as shown in **Photo C**, center the cases side-to-side on the panel with the back edge of the side rear trim (K) flush with the back of the rear panel edging (D). Drill countersunk shank holes through the case bottoms (H) into the panel (E), where shown on **Drawings 2** and **3**, and drive the screws.

9 Position the top panel assembly (D/E/F) on the cases, centered side-to-side, with the back edge of the panel edging (D) flush with the back edge of the side rear trim (K). From inside the cases, drill the mounting holes through the tops (H) into the panel (E), and drive the screws.

INSTALL THE SIDE REAR TRIM

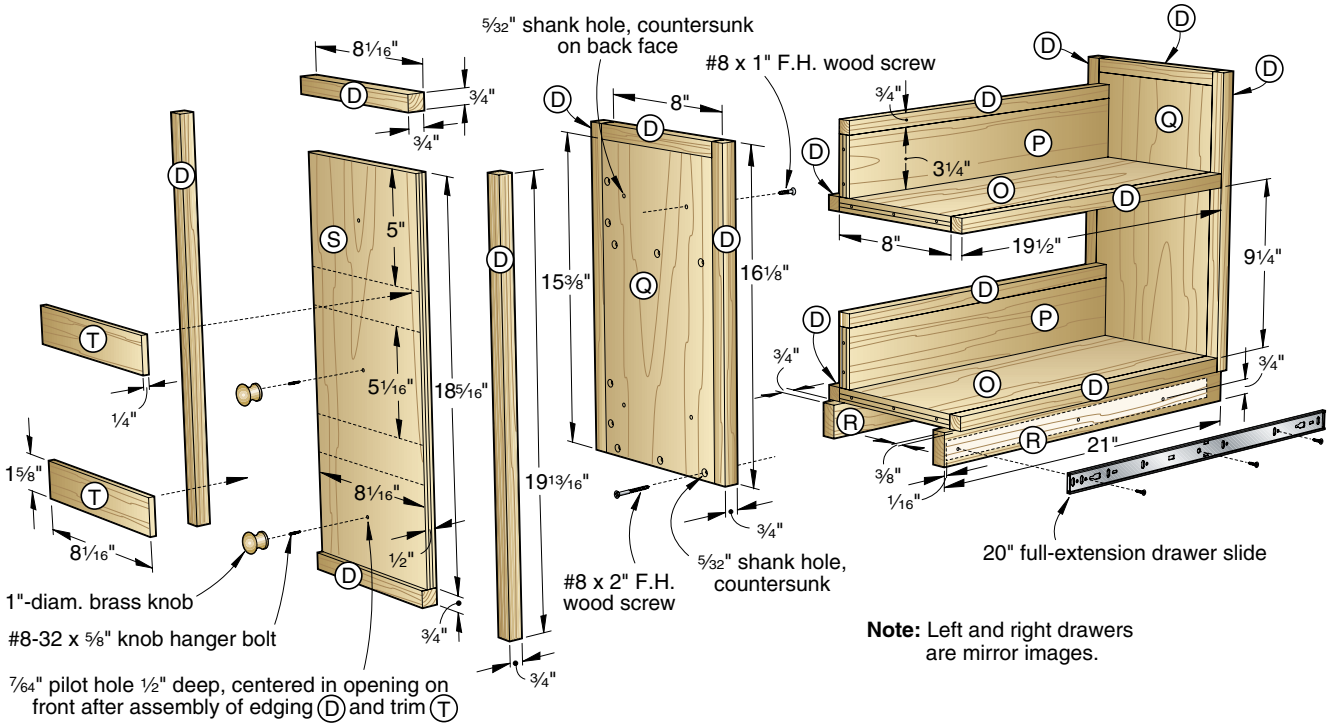


Glue and clamp the side rear trim (K) tight against the top/bottom trim (J). The rear trim overhangs the case ½" for the back (N).

MOUNT THE CASES TO THE BASE

With the cases aligned on the base assembly (see Step 8) and positioned 18" apart with spacers, screw the cases to the base.

4 DRAWER (Left drawer shown)



Note: Left and right drawers are mirror images.

Time to construct the dual-shelf drawers

1 From ¾" oak plywood, cut the shelves (O), shelf rails (P), and false fronts/backs (Q) to the sizes listed. Then, from the edging blanks (D), crosscut pieces to the lengths needed for the shelves, rails, and fronts/backs, where shown on **Drawing 4**. Apply the edging. As an option, you easily can add sliding supports to the shelves for your media. For more on this, see the Top Shop Tip on *page 24*.

2 Glue and clamp the shelf rails (D/P) to the shelves (D/O), aligning the rails with the shelf/edging joints and keeping the ends of the rails and shelves flush, where shown.

3 From ¾"-thick stock, cut the drawer-slide supports (R) to size. Then glue and clamp the supports to the bottom of the bottom shelves (D/O) ⅜" from the outside edge of the edging (D) and centered with a ¾" overhang at each end, where shown on **Drawing 4** and as shown in **Photo D**.

4 Pair together the false front/back (D/Q) for each drawer, and identify the parts ("LFF" for the left false front, for example). On the *front* face of the parts, mark centerpoints for 10 countersunk shank holes, where dimensioned on **Drawing 5**, noting the left and right drawers are mirror images. Then, on the *back* face of the false fronts only, mark centerpoints for the four countersunk shank holes for attaching the fronts (S), where dimensioned. Drill and countersink the holes.

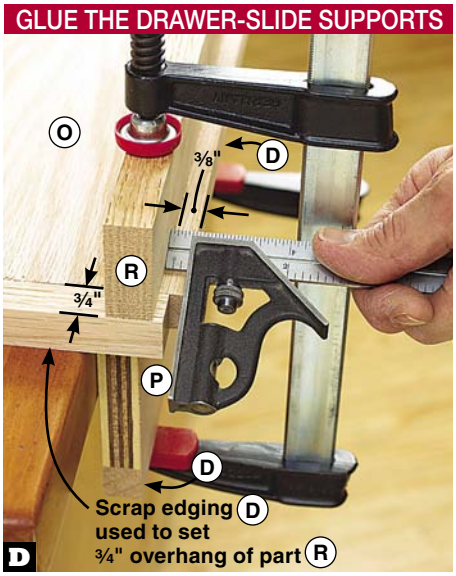
5 To assemble the drawers, clamp together (no glue) the top shelf assemblies (D/O/P), bottom shelf assemblies (D/O/P/R), and false fronts/backs (D/Q), using spacers to position the shelves 9¼" apart, where dimensioned on **Drawing 4** and as shown in **Photo E**. Using the countersunk shank holes in the false fronts/backs as guides, drill pilot holes into the shelf assemblies. Then drive the screws.

6 From ½" oak plywood, cut the fronts (S) to size. Sand the fronts smooth.

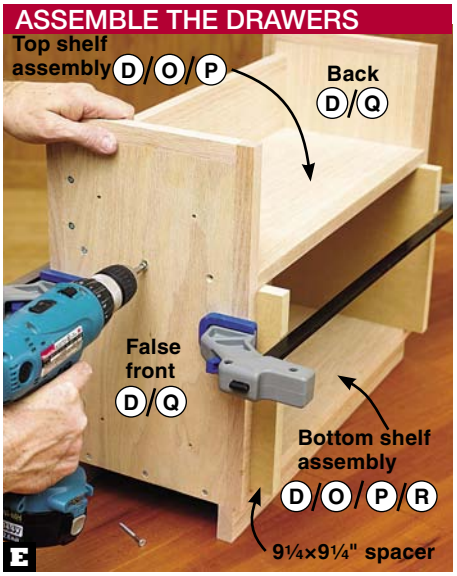
7 From the edging blanks (D), crosscut pieces to the lengths needed for the edges and ends of the fronts (S). On a flat surface, apply the edging, keeping it flush with the back face of the fronts.

8 From ¾"-thick stock resawn or planed to ¼" thick, cut the front trim (T) to size to fit between the edging (D) on the fronts (S). Glue and clamp the trim to the fronts, where dimensioned. After the glue dries, mark centerpoints centered in the openings on the *front* face of the fronts for the knob mounting holes, where shown. Drill the holes.

9 Fit your tablesaw with a standard ⅛"-kerf blade. Then crosscut two ⅛"-deep grooves across the front assemblies (D/S/T), where dimensioned on **Drawing 2**. (The grooves are for accent purposes only.) Set the fronts aside.

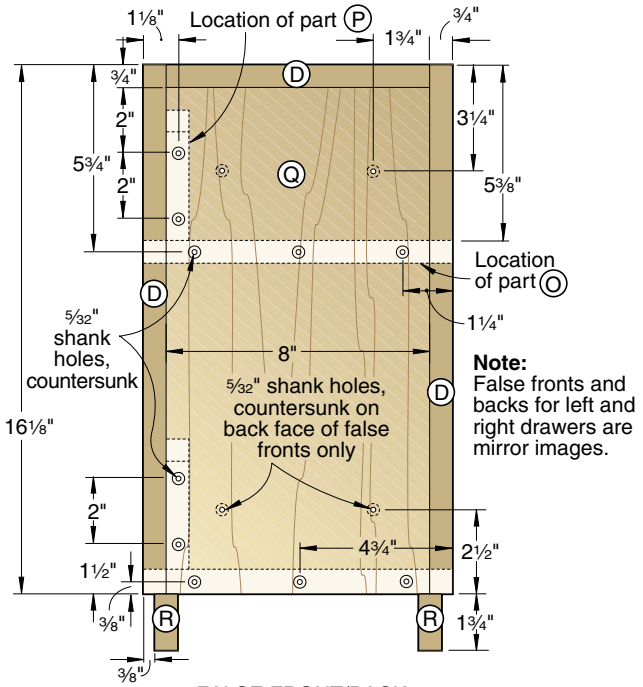


Glue and clamp a support (R) to the bottom of a bottom shelf (D/O), ⅜" from the outside edge with a ¾" overhang at each end.

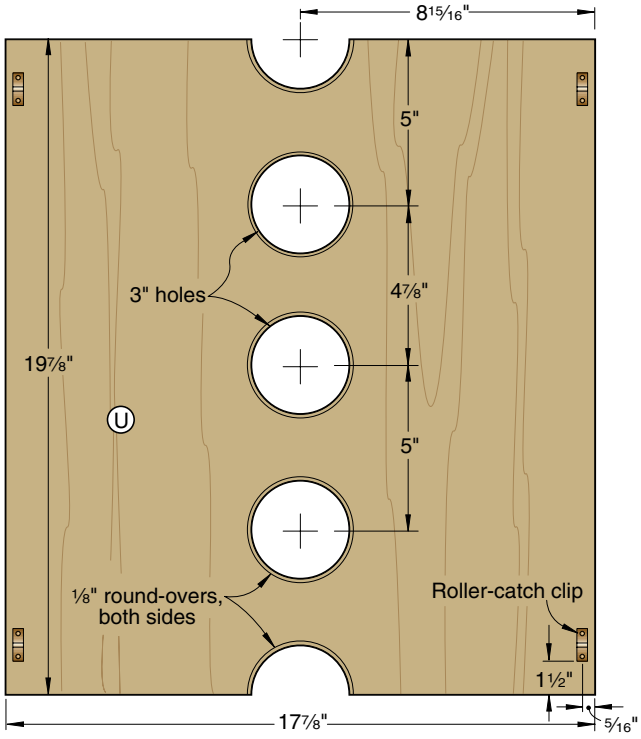


With a top and bottom shelf assembly spaced 9¼" apart, drive screws through the false fronts/backs (D/Q) into the assemblies.

5 PARTS VIEW



FALSE FRONT/BACK
(Front face of left false front shown)



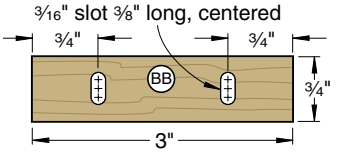
BACK

Install the drawer slides, fronts, and case backs

1 To mount the 20" full-extension drawer slides, press the release lever and separate the slide members. Using ¼" hardboard for a spacer, position an outer slide member in a case against the drawer-slide spacer (M), ⅞" back from the front face of the front trim (L), where dimensioned on **Drawing 3a** and as shown in **Photo F**. Mark the centers of the *horizontal* slots in the slide. Drill pilot holes, and drive the screws supplied with the slide. Using the same spacing and on the opposite side of the case, mount an outer slide member on the side (G). Repeat to mount the remaining outer slides in the other case.

2 Using a combination square, draw a line along the length of each drawer-slide support (R) ¾" from the *bottom* edge on the *outside* face. Position an inner slide member on a support, 1/16" from the front end, where dimensioned on **Drawing 4**, with the mounting holes centered on the marked line. Mark the centers of the *vertical* slots in the slide. Drill pilot holes, and drive the screws. Repeat to mount the remaining inner slides.

3 Insert the drawers into the cases, engaging the slides. Verify the drawers move smoothly. If needed, adjust the position of the inner slide members on the drawer-slide supports (R). Then drill pilot holes centered in the round holes in the slides, and drive the screws to fix the slide positions.



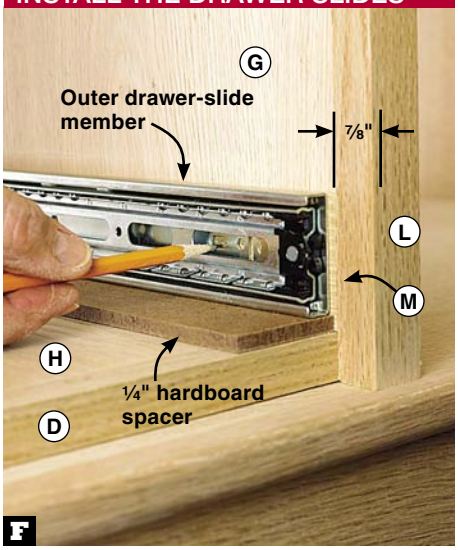
DOORSTOP TOP VIEW

4 To mount the drawer fronts (D/S/T) to the false fronts (D/Q), position a front, centered top-to-bottom and side-to-side, in the case opening. Measure the bottom reveal. Then make two shims equal in thickness to your measurement. (Our reveal measured 3/32".) Next, apply 2"-wide, cloth-backed, double-faced tape to the false front. Reposition the front in the case opening, inserting the shims at the bottom to aid alignment. Firmly press the drawer front against the false front. Repeat for the other front.

From the back of each case, push the drawer fully out. Clamp the drawer fronts to the false fronts, as shown in **Photo G**. Now drive the screws through the four countersunk shank holes on the back face of the false fronts into the drawer fronts. Remove the screws, drawer fronts, and tape, and reattach the fronts.

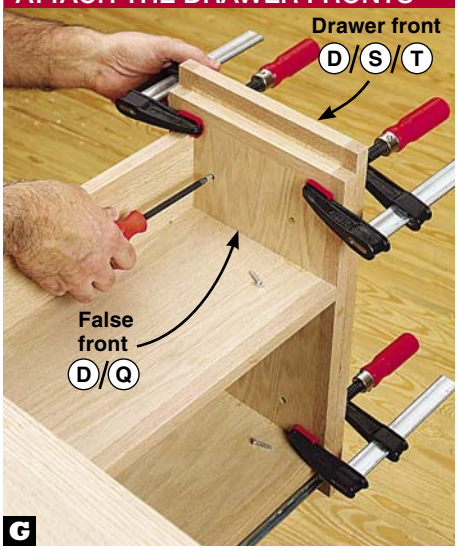
5 Retrieve the backs (N). Then glue and clamp them in place on the cases, where shown on **Drawing 3**, tight against the side rear trim (K).

INSTALL THE DRAWER SLIDES



Positioning an outer slide member on a drawer-slide spacer (M), as shown, mark the centers of the *horizontal* slots.

ATTACH THE DRAWER FRONTS



Clamp a taped drawer front (D/S/T) to a false front (D/Q) to prevent movement. Then drive the screws to fasten the fronts together.

Add the cabinet back and shelves

1 From ½" oak plywood, cut the back (U) to size to fit the opening between the case backs (N). Draw 3" holes and semicircular cutouts (for wire pass-through and panel removal) on the back, where dimensioned on **Drawing 5**. Drill ½" blade start holes through the 3" hole outlines. Then jigsaw the holes and semicircular cutouts to shape. Rout a ⅛" round-over on the edges of the holes and cutouts on both faces.

2 Position roller-catch clips on the *front* face of the back (U), where dimensioned. Mark the center of the mounting holes in the clips. Drill pilot holes, and attach the clips using the supplied screws. To mount the mating double roller catches to the case sides (G), engage the catches on the clips, and position the back in the opening. Mark the catch mounting holes, as shown in **Photo H**. Remove the back and catches. Drill pilot holes, and screw the catches to the sides. Set the back aside.

3 From ¾" oak plywood, cut the three shelves (V) to size. Then, from ¾"-thick stock, cut the shelf trim (W) to size. Glue and clamp the trim to the front edge of the shelves, flush with the ends and top faces. Set the shelves aside.

Make the stylish doors for the cabinet center

1 From ¾"-thick stock, cut the bottom rails (X), top rails (Y), and stiles (Z) for the doors to the sizes listed. Save your rail cutoffs for making test tenons.

2 Using a dado blade in your tablesaw, cut a ¼" groove ⅜" deep centered along the *inside* edges of the bottom rails (X) and stiles (Z), where shown on **Drawing 6**. Raise the blade to ⅞". Now cut a centered groove along the *inside* edges of the top rails (Y).

3 Attach an auxiliary extension to your miter gauge and an auxiliary fence to the rip fence. Using your dado blade, form a ¼" tenon ⅜" long on a rail cutoff, where shown on **Drawing 7**. Test-fit the tenon in the groove in a stile (Z). Adjust your setup, if needed. Then cut the tenons on both ends of the bottom and top rails (X, Y).

4 Noting the left and right top rails (Y) are mirror images, draw the curve along the bottom edge, where dimensioned. Bandsaw and sand to the lines.

5 To remove the *back* lip of the groove in the bottom and top rails (X, Y), where shown, to receive the glass and glass stops (AA), switch to a standard blade in your tablesaw. Position the fence 1⅝" from the *inside* face of the blade, and raise the blade to 5/16". Keeping the *top* edge of a top rail (Y) tight against the fence with the *back* face down, cut off the lip. Repeat for the other top rail. Using the same setup, position the *bottom* edge of a bottom rail (X) against the fence with the *back* face down. Cut off the lip. Repeat for the other bottom rail.

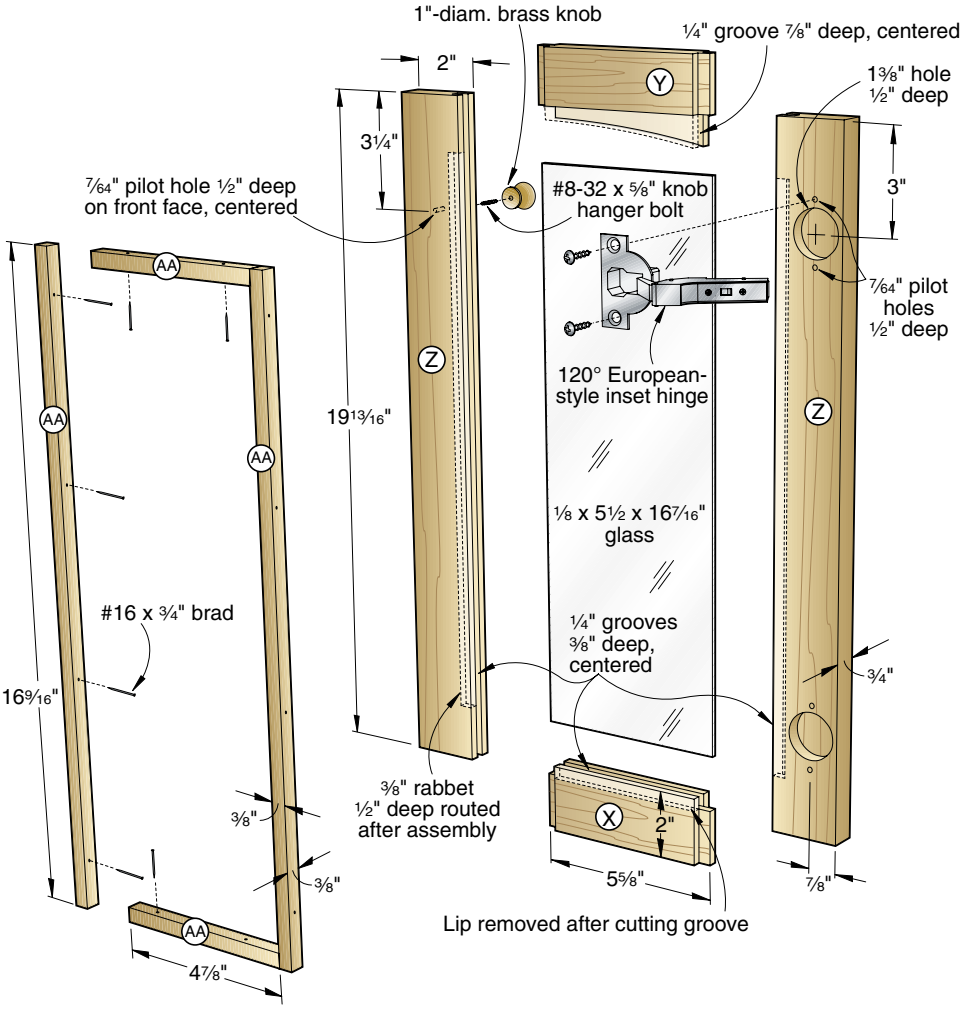
6 Glue and clamp the bottom and top rails (X, Y) and stiles (Z) together, checking for square.

7 Chuck a ⅜" rabbeting bit in your router. Then, on the *back* of each door, rout a ½"-deep rabbet along the *inside* edges of the stiles (Z), where shown on **Drawing 6**, removing the back lip of the grooves. Make sure the bit guide bearing makes good contact with the front lip before routing the rabbet. Square the ends of the rabbets with a chisel.

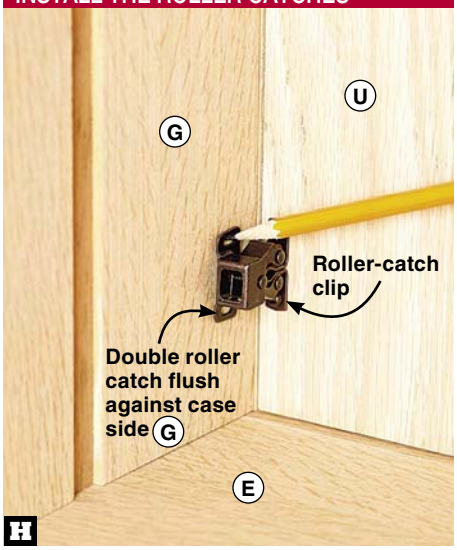
8 On the *front* face of the *inner* stile (Z) of each door, mark a centerpoint for a knob hanger bolt for mounting a 1"-diameter brass knob, where dimensioned. Drill a 7/64" pilot hole ½" deep at the marked locations.

Next, on the *back* face of the *outer* stile of each door, mark centerpoints for 1⅜" holes ½" deep for the 120° European-style inset hinges, where dimensioned. Using a Forstner bit in your drill press, bore the holes. (Because the length of the centerpoint varies

6 DOOR (Left door viewed from back)

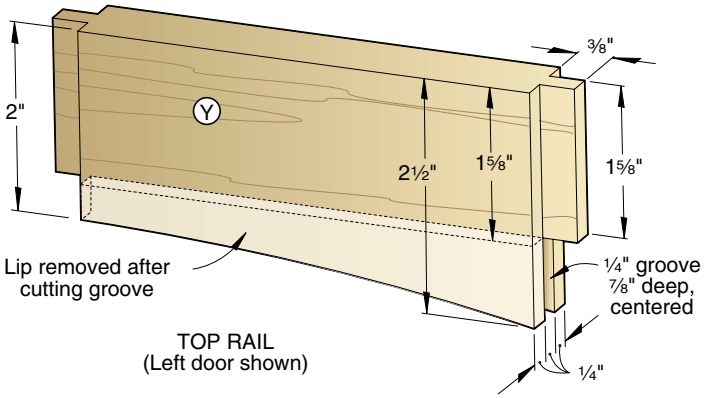


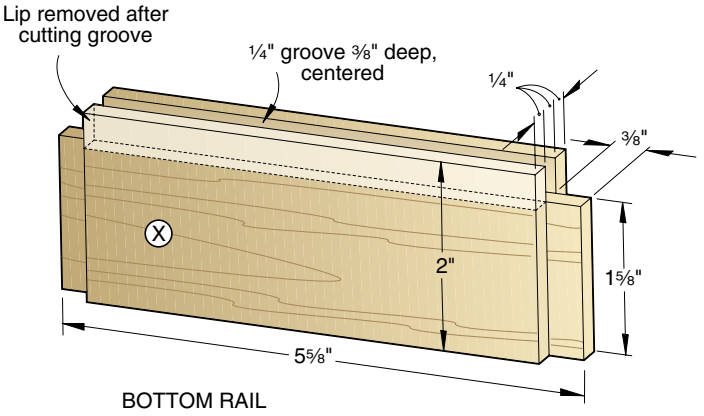
INSTALL THE ROLLER CATCHES



With a double roller catch engaged on the mating clip and flush against a case side (G), mark the centers of the mounting holes.

7 DOOR-RAIL TENONS (Viewed from back)





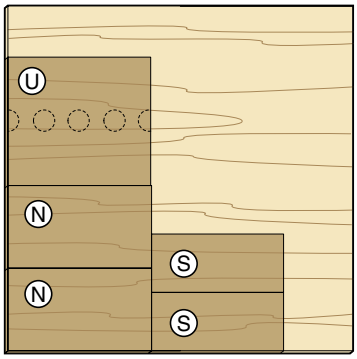
Note: Top rails for left and right doors are mirror images.

on Forstner bits, we bored a hole in ¾"-thick scrap first to make sure the tip would not go through the piece.) Position a hinge-cup member in each hole, and mark the mounting holes. Now drill pilot holes, and drive the screws supplied with the hinges.

9 To mount the mating hinge-plate members, mark centerpoints on the *outside* face of the case sides (G) for the mounting holes, where dimensioned on **Drawing 2c**. Drill pilot holes. Then secure the mounting plates using the supplied screws. Now hang the doors, clipping the hinge arm to the mounting plate. Adjust the hinge screws as needed to establish an equal reveal all around and between the doors.

10 From ¾"-thick stock planed to ⅜" thick, cut the glass stop blank (AA) to size. Crosscut pieces from the blank to the lengths needed to fit the doors, where shown on **Drawing 6**. Set the stops aside.

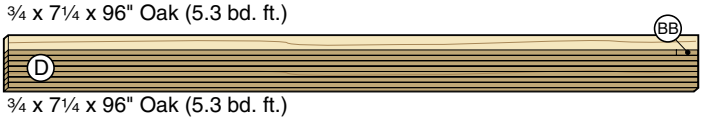
11 From your leftover edging blanks (D), crosscut a 3"-long piece for the door-stop (BB). Using a 3/16" twist bit in your drill press and drilling overlapping holes, form ⅜"-long slots in the stop, where dimensioned on **Drawing 5**. Position the stop on the bottom of the top panel (E), centered between the cases, where shown on **Drawing 2**, and 2⅛" from the front edge of the front top-panel trim (F), where shown on **Drawing 2a**. Mark the centers of the slots using an awl. Then drill pilot holes at the marked locations. Set the stop aside.



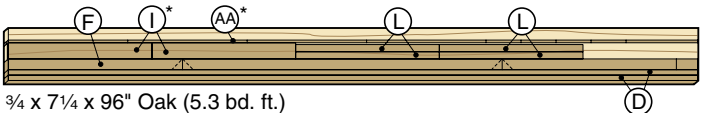
½ x 48 x 48" Oak plywood

Cutting Diagram

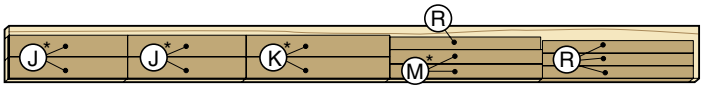
¾ x 7¼ x 96" Oak (5.3 bd. ft.)



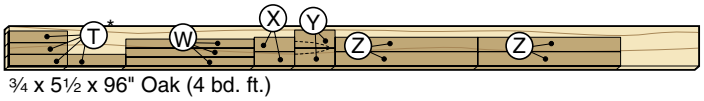
¾ x 7¼ x 96" Oak (5.3 bd. ft.)



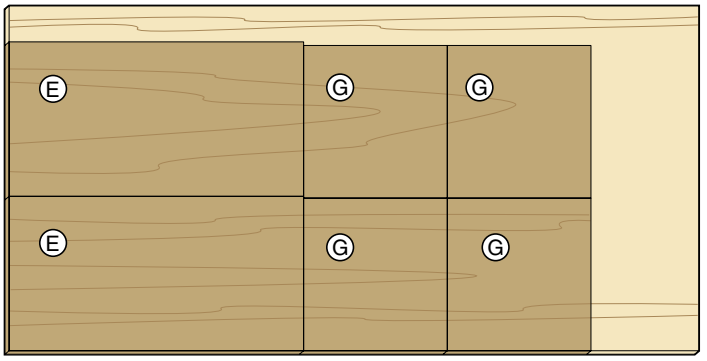
¾ x 7¼ x 96" Oak (5.3 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



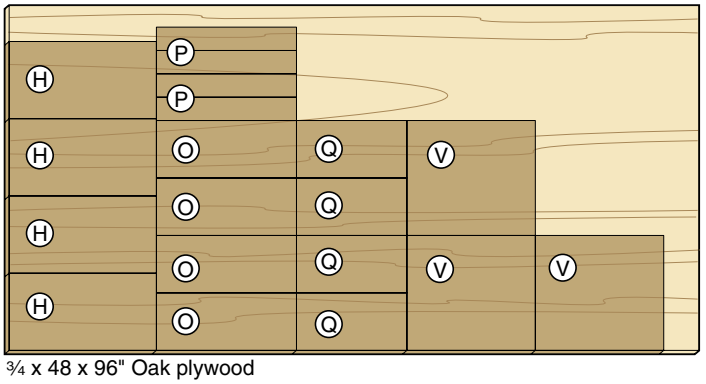
¾ x 7¼ x 96" Oak (5.3 bd. ft.)



¾ x 5½ x 96" Oak (4 bd. ft.)



¾ x 48 x 96" Oak plywood



¾ x 48 x 96" Oak plywood

Two pieces of front trim (T), with ⅛" grooves centered along the front face, create faux three-panel drawer fronts (S) that add style to the entertainment center while cleverly concealing the dual-shelf drawers used for media storage.

Time to apply the finish and install the shelves

1 Remove the doors, drawers, and all hardware. (We marked the door hinge parts and the mounting locations to ensure correct reinstallation and avoid hinge readjustment.) Sand the cabinet, back, drawers, and doors to 220 grit, and remove the dust. Apply a stain, if you wish. (We used Zar Oil-Based Stain, no. 110 Salem Maple.) Then apply three coats of a clear finish. (We used AquaZar Water-Based Clear Satin Polyurethane, sanding to 320 grit between coats.)

2 Install the hardware. Then, to mount the 1"-diameter brass knobs on the drawer fronts (S), where shown on **Drawing 4**, and on the door stiles (Z), where shown on **Drawing 6**, prethread the previously drilled 7/64" pilot holes ½" deep in the fronts and stiles with a #8×1" flathead wood screw. Thread #8-32×⅝" knob hanger bolts into the knobs. Now mount the knobs on the fronts and doors. Slide the drawers into the cases.

3 From ⅝" shelf standards 24" long, hacksaw four 20"-long pieces to fit the grooves in the inner case sides (G). Note the inch markings on the standards, and make sure you cut and install them so the slots for the shelf supports align. Place the standards in the grooves, and secure them in place with the supplied nails. Now install the shelves (V/W) where desired using shelf supports.

4 Have two pieces of ⅛×5½×16 7/16" glass cut for the doors. Install the glass and glass stops (AA) in each door, where shown on **Drawing 6**, using #16×¾" brads. To prevent splitting the stops, drill holes in them using a #16×1" brad with the head snipped off. Also, place a piece of cardboard or ⅛" hardboard on the glass to protect it while driving the brads. Rehang the doors.

5 Apply two ½"-diameter adhesive-backed rubber bumpers to the front face of the doorstop (BB), where shown on **Drawings 2** and **2a**. Then screw the doorstop to the top panel (E), positioning it so the doors close flush against it.

6 Finally, using a helper, place your TV on top of the entertainment center. Set your electronic components on the shelves (V/W), and route the wiring through the holes in the back (U). Snap the back into position. Then load the drawers with videos and CDs. Now rustle up some popcorn and drinks, put your feet up, and enjoy a movie while admiring your handiwork.

Written by **Owen Duvall** with **Chuck Hedlund**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine**

Materials List

	Base	FINISHED SIZE T	W	L	Matl.	Qty.
A	side rails	¾"	2¾"	18"	O	2
B	front/back rails	¾"	2¾"	37"	O	2
C*	foot halves	¾"	2¼"	4½"	O	8
Panel edging						
D	edging blanks	¾"	¾"	96"	O	9
Top/bottom						
E	top/bottom panels	¾"	21½"	41"	OP	2
F	top-panel trim blank	¾"	1½"	96"	O	1
Cases (2 needed)						
G	sides	¾"	21¼"	20"	OP	4
H	tops/bottoms	¾"	10¾"	20½"	OP	4
I	side front trim	¼"	2¼"	20"	O	2
J	side top/bottom trim	¼"	3"	16½"	O	4
K	side rear trim	¼"	3"	20"	O	2
L	front trim	¾"	1"	20"	O	4
M	drawer-slide spacers	¼"	2"	21¼"	O	2
N	backs	½"	11½"	20"	OP	2
Drawers (2 needed)						
O	shelves	¾"	8"	19½"	OP	4
P	shelf rails	¾"	3¼"	19½"	OP	4
Q	false fronts/backs	¾"	8"	15⅜"	OP	4
R	drawer-slide supports	¾"	1¾"	21"	O	4
S	fronts	½"	8 1/16"	18 5/16"	OP	2
T	front trim	¼"	1⅝"	8 1/16"	O	4
Back and shelves						
U	back	½"	17⅞"	19⅞"	OP	1
V	shelves	¾"	16"	17⅞"	OP	3
W	shelf trim	¾"	1¼"	17⅞"	O	3
Doors (2 needed)						
X	bottom rails	¾"	2"	5⅝"	O	2
Y	top rails	¾"	2½"	5⅝"	O	2
Z	stiles	¾"	2"	19 13/16"	O	4
AA	glass stop blank	⅜"	⅜"	96"	O	1
BB	doorstop	¾"	¾"	3"	O	1

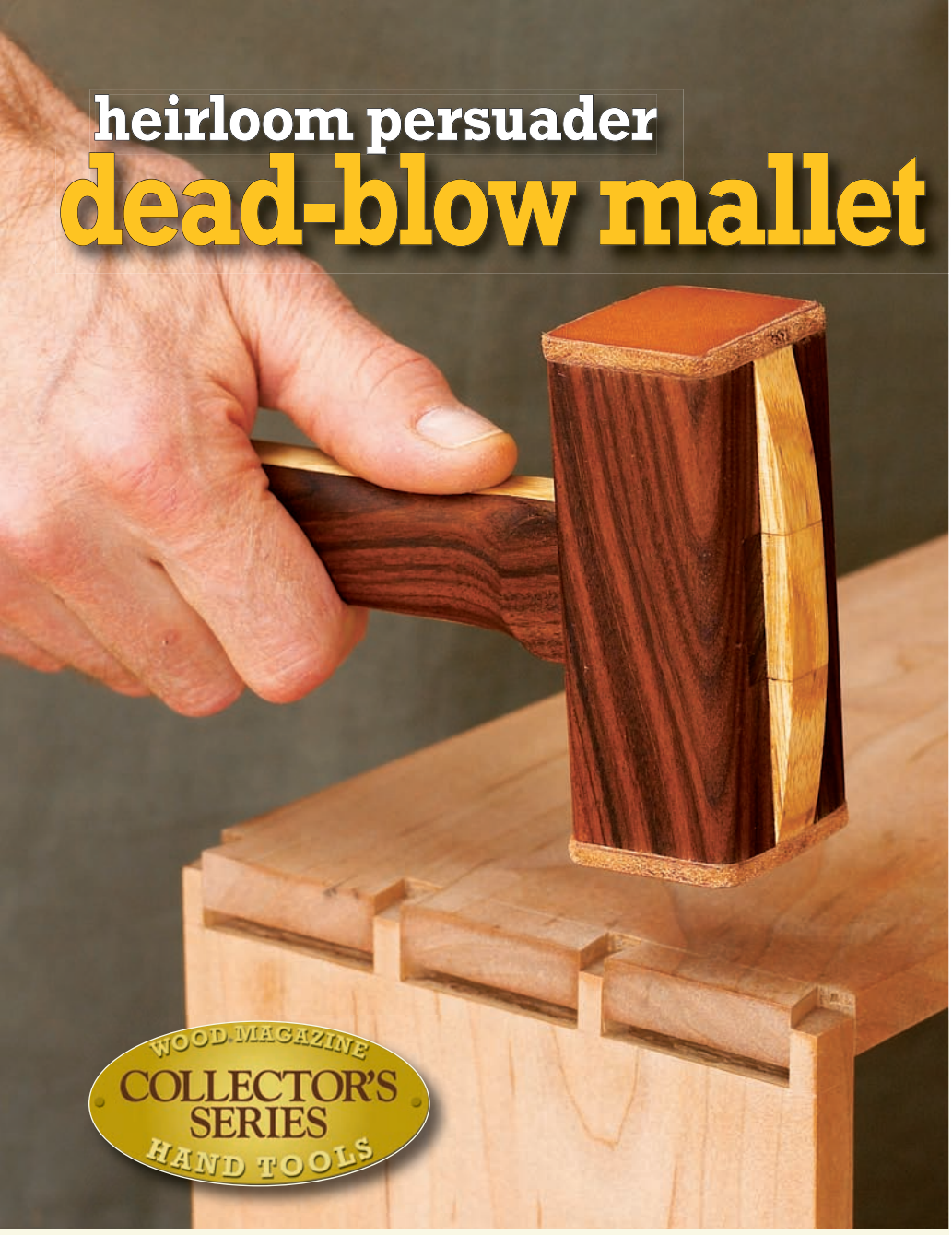
*Parts initially cut oversize. See the instructions.
Materials key: O–oak, OP–oak plywood.
Supplies: Spray adhesive; 2"-wide, cloth-backed, double-faced tape; #8×1", #8×1¼", and #8×2" flathead wood screws; #10 biscuits; ⅛×5½×16 7/16" glass (2); #16×¾" and #16×1" brads; #8×1¼" panhead wood screws (2); #8 flat washers (2); ½"-diam. adhesive-backed rubber bumpers (2).
Blades and bits: Dado-blade set, ⅛" and ⅜" round-over and ⅜" rabbeting router bits, 1⅜" Forstner bit.

Source

Hardware: 1"-diameter brass knobs no. 36467, $4.49 ea. (8); #8-32×⅝" knob hanger bolts no. 70623, $2.49 per pkg. of 8 (1 pkg.); double roller catches no. 29785, $3.39 per pkg. of 4 (1 pkg.); 120° European-style inset hinges no. 55833, $12.99 pr. (2 pr.); 20" full-extension drawer slides no. 32508, $16.99 pr. (2 pr.); ⅝" shelf standards 24" long no. 33779, $1.79 ea. (4); shelf supports no. 33910, $4.49 per pkg. of 16 (1 pkg.). Call or click Rockler, 800/279-4441; rockler.com.

heirloom persuader

dead-blow mallet



Why you need a dead-blow mallet

The head of this mallet contains loose lead shot for controlled impact without bounce-back. As the mallet strikes the work surface, the shot moves forward immediately behind the blow to dampen the rebound and solidly transmit the force. It's the ideal tool for assembling two tightly fitting workpieces. And because it puts more weight behind a short swing, a dead-blow mallet works great in close quarters. To see more hand tools in this series, go to woodmagazine.com/handtools.

Whether coaxing together the closely fitted dovetails of a drawer, finger joints of a box, or mortise-and-tenon joints of a cabinet door, you'll appreciate the concentrated no-rebound striking power of this handsome mallet. Filled with about 5 ounces of loose lead shot and faced with thick leather pads, it packs a wallop without leaving a mark. You can make the mallet from shop scraps, or see **Sources** for the necessary supplies.

Make a laminated handle

1 For the handle sides (A), cut two ⅜×1¼×10" morado blanks. (For an explanation of our wood choices, see the sidebar *far right*.) Then for the handle core (B), head cap and base (C), faces (D), and filler (E) cut one ½×3×12" ash blank. From this blank, cut a 1¼×8⅝" piece for the core and set the rest aside. Glue and clamp the core between the sides, keeping the edges and one end flush.

2 Joint one edge of the handle (A/B) flush and square to the face and rip it to 1$\frac{5}{32}$" wide. Then joint $\frac{1}{32}$" from the sawn edge for a finished width of 1⅛". Make a copy of the handle pattern on the *WOOD Patterns®* insert and adhere it to the handle with spray adhesive, where shown on **Drawing 1**. Install a ¾" dado blade in your tablesaw and cut 1½" rabbets ⅛" deep, where shown on the pattern. Now with the pattern facing up, bandsaw and sand the handle to shape.

3 Chuck a ⅜" round-over bit into your table-mounted router, attach an auxiliary extension to the miter gauge, and finish rounding the end of the handle, as shown in **Photo A**. Then move the router-table fence away from the bit and rout the handle edges where shown on the pattern, as shown in **Photos B** and **C** in the sidebar, *right*.

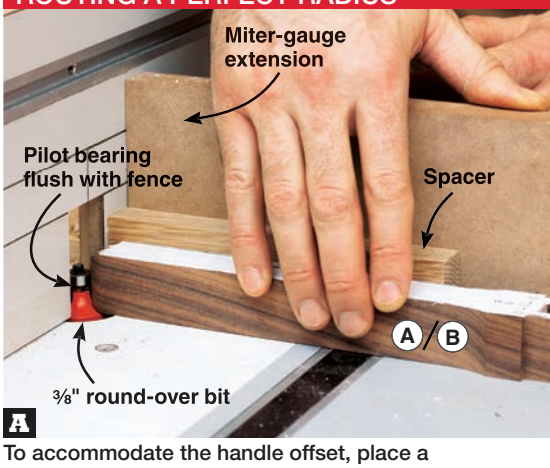
Form the head parts

1 Retrieve the ½"-thick ash and cut a ¾×9" blank for the cap and base (C). Make a copy of the two cap and base patterns on the insert, adhere them to the blank with spray adhesive, and form the end rabbets, as shown in **Photo D**. Then flip the blank over and cut the dadoes in the tops of the parts. Now cut the parts from the waste and bandsaw and sand the curved edges. For filling the head with lead shot after the mallet is assembled, drill a $\frac{5}{16}$" hole in the cap, centered in the dado, where shown on **Drawing 2**.

2 For the faces (D) and filler (E), cut three ½×1⅛" pieces from the ½"-thick ash.

3 For the cheeks (F), plane a ¾×1½×12" morado blank to ⅝" thick. Lay out the 4"-long cheeks at each end of the blank and the centered 1⅛" dadoes ¼" deep, where shown on **Drawing 2**. Chuck a ¼" round-over bit in your table-mounted router and rout the outside edges of the blank. Now cut the dadoes, check the fit of the handle, and then crosscut the parts from the blank.

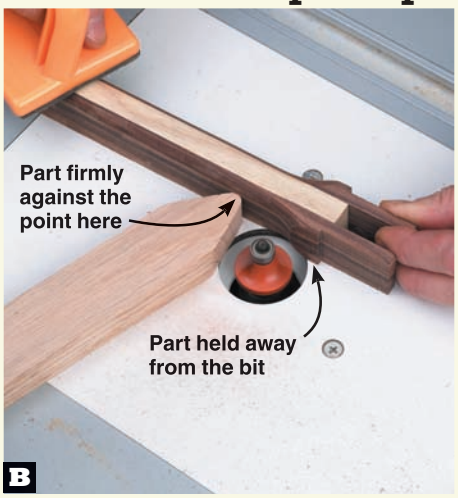
ROUTING A PERFECT RADIUS

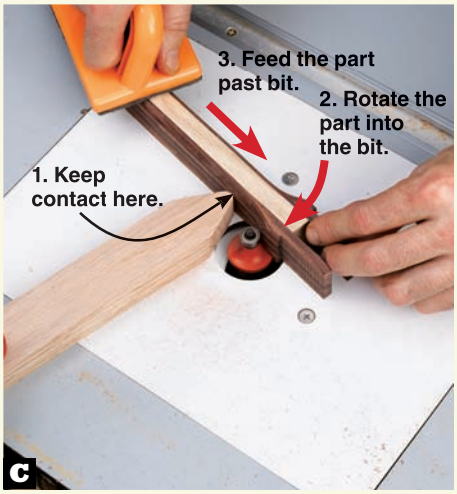


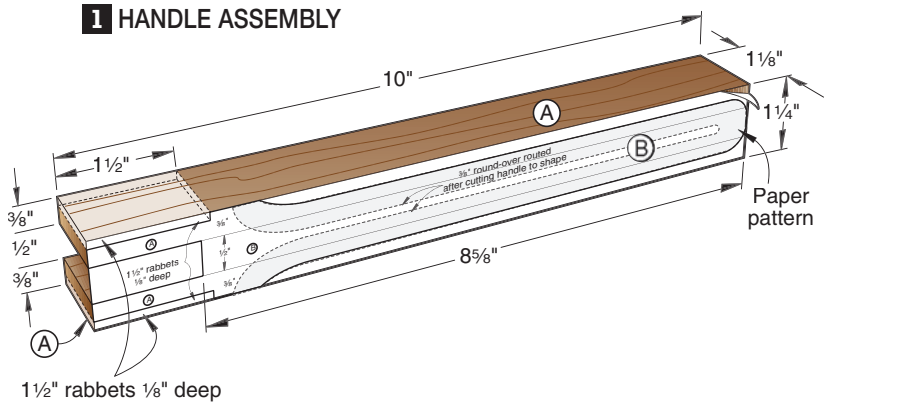
To accommodate the handle offset, place a spacer between the handle and the miter-gauge extension, and round over the end.

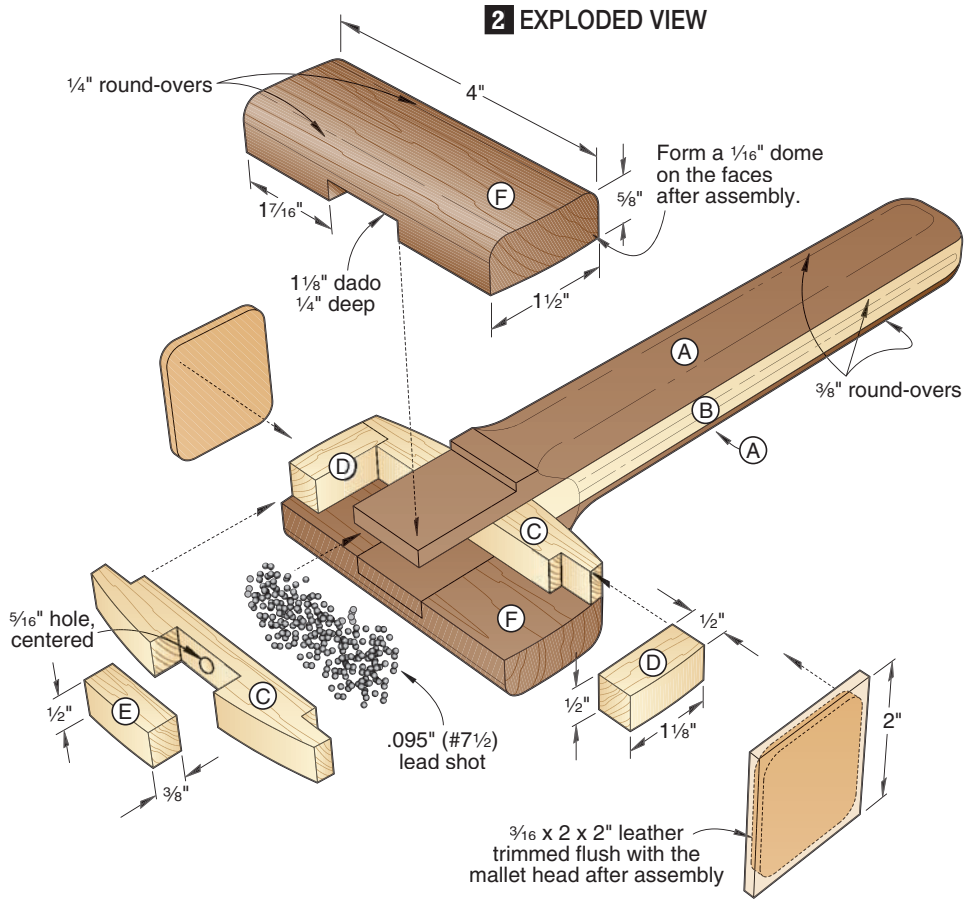
Safe freehand routing begins with a starter pin or point

When the shape of a part, such as the mallet handle, prevents you from supporting it with the router-table fence while routing, you depend on the bit pilot bearing to guide the piece. But you'll have to rout away some material before the part contacts the bearing, and the bit can suddenly grab and pull the part from your grasp. To prevent this, some router-table inserts are equipped with starter pins, or you can simply form a point on a piece of stock and clamp it to the router table, as shown at *right*. Either way, before engaging the bit, place the part firmly against the pin or point, as shown in **Photo B**. Then pivot the part on the starter pin or point and ease it into the bit until it contacts the pilot bearing, as shown in **Photo C**. Now rout along the part length.









COMBINE PARTS ON ONE BLANK

Backing the cuts with a miter-gauge extension, position the blank for the cap and base (C) with a stopblock, and cut the rabbets.

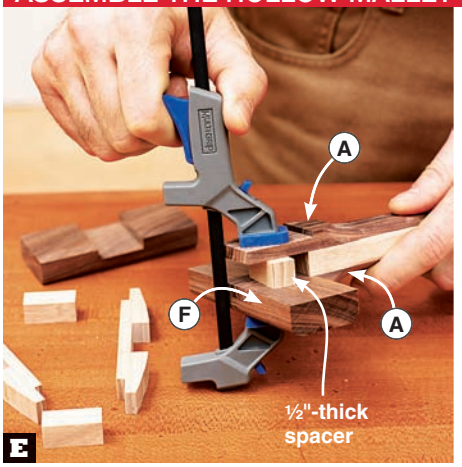
Choosing wood for your mallet

Tropical hardwoods, because of their stability and density, have been favored by tool makers for generations. Rosewood, long a favorite, meets these utilitarian requirements with the added advantage of unsurpassed beauty. But with genuine rosewood logged nearly to extinction, hardwood dealers substitute other look-alike tropical species. For outside parts of this mallet we used morado, sometimes called Bolivian rosewood.

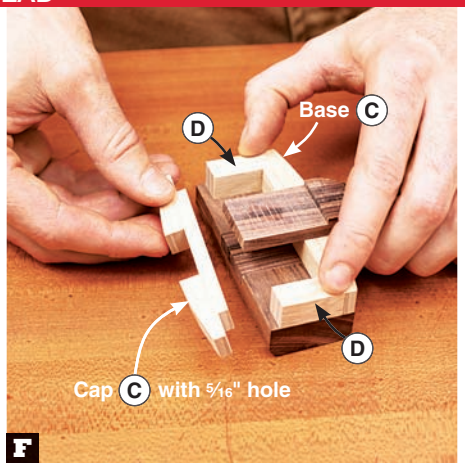
For the core of the handle and head we chose ash. Baseball bats and hammer handles traditionally utilize wood species such as hickory and ash, known for their resilience. A handle as short as this one doesn't require much resilience, but the ash contrasts nicely with the morado for a pleasing appearance that matches other tools in the Collector's Series. If you wish, you can construct your mallet from any contrasting hardwood scraps.

continued on page 54

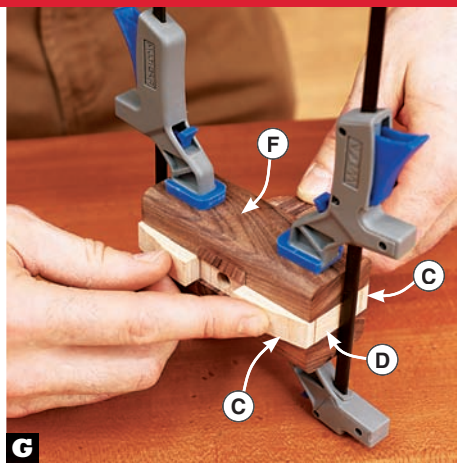
ASSEMBLE THE HOLLOW MALLET HEAD



Insert a ½"-thick spacer between the handle sides (A), apply glue to the dado in one cheek (F), and glue and clamp it to the handle.



Apply glue to the base and cap (C) and the faces (D) and position them, seating the faces in the base and cap rabbets.



Apply glue to the base and cap (C), faces (D), and side (A). Making sure the base, cap, and faces are seated, clamp the cheek (F) in place.

Assemble and apply finish

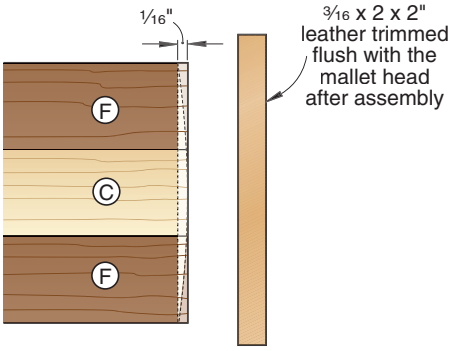
1 Glue and clamp the head parts to the handle, as shown in **Photos E**, **F**, and **G**. With the glue dry, file and sand a 1/16" dome on the faces of the mallet head, where shown on **Drawing 3**.

2 With the mallet upright, use a funnel to fill the head with .095"-diameter (#7½) lead shot. While filling the head, tap the side to settle the shot so you can pour in as much as possible. Then glue the filler (E) in place, where shown on **Drawing 2**. Sand the filler to match the curve of the cap (C).

3 Cut two 2×2" pieces of 3/16"-thick leather for face pads. Sand the rough back of the leather with 80-grit sandpaper, getting it as smooth as possible. Then use ordinary woodworking glue to adhere the pads to the slightly domed mallet faces, as shown in the **Shop Tip**, *below*.

4 With the glue dry, use a utility knife to trim the leather flush with the mallet head. Then finish-sand the mallet, smoothing the edges of the leather pads as you sand. Apply a clear finish to the mallet, including the edges and faces of the leather pads. (We applied three coats of Minwax Antique Oil Finish.) Now show off the newest addition to your fine tool collection to your friends.

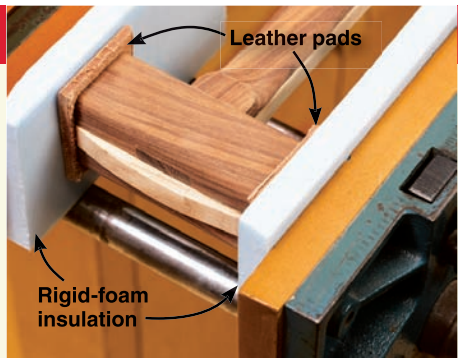
3 MALLET FACE DOME (Top view)



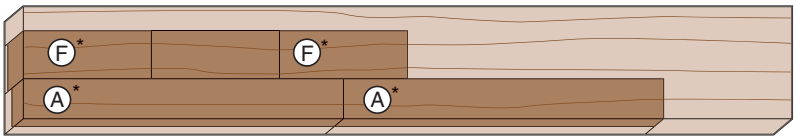
SHOP TIP

Foam pads ensure a good bond on slightly curved surfaces

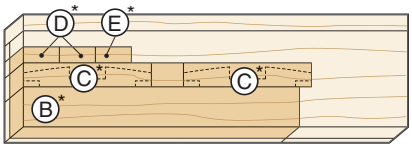
To apply even pressure when gluing the leather pads to the domed mallet faces, line your bench vise jaws with rigid-foam insulation. Spread glue on the mallet faces and apply the oversize leather pads. Position the mallet and pads between the foam. Then tighten the vise, slightly crushing the foam to make it conform to the domed surfaces.



Cutting Diagram



¾ x 3½ x 24" Morado (.7 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



¾ x 3½ x 12" Ash (.3 bd. ft.)

Written by **Jan Svec** with **Kevin Boyle**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

		FINISHED SIZE T	W	L	Matl.	Qty.
Handle						
A*	sides	⅜"	1⅛"	10"	M	2
B*	core	½"	1⅛"	8⅝"	A	1
Head						
C*	cap and base	½"	⅝"	4"	A	2
D*	faces	½"	½"	1⅛"	A	2
E*	filler	½"	⅜"	1⅛"	A	1
F*	cheeks	⅝"	1½"	4"	M	2

*Parts initially cut oversize. See the instructions.
Materials key: M–morado, A–ash.
Supplies: Spray adhesive.
Blades and bits: Stack dado set, ⅜" and ¼" round-over router bits.

Sources

Wood and supplies. Morado and ash planed to thickness for the parts listed *above*, 3/16×2×4" piece of leather, 5 oz. of .095" (#7½) lead shot. Kit no. W165-M, $21.95 ppd. for one kit, $89.95 ppd. for five kits. Heritage Building Specialties. Call 800/524-4184, or go to heritagewood.com.
Lead shot. .095" (#7½) lead shot no. 9030K23, $18.08 for a 5-lb. package. McMaster-Carr. Call 630/833-0300, or go to mcmaster.com. You also may check local gun dealers who carry reloading supplies.

Better Homes and Gardens®

WOOD® PATTERNS®

October 2005 *Issue 165*

Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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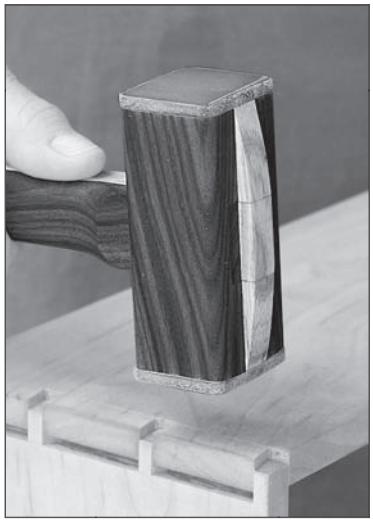
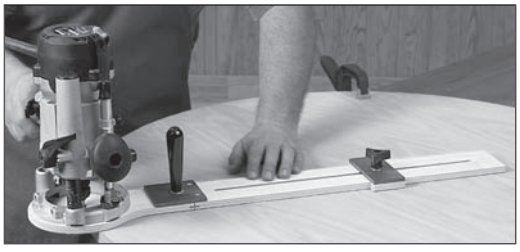


Mallet, Page 52

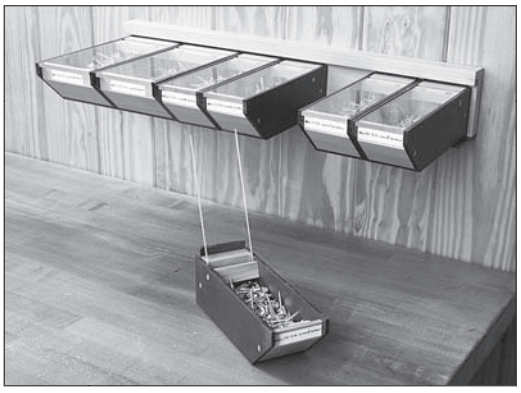
Jewelry Box, Page 64

Bookcase, Page 76

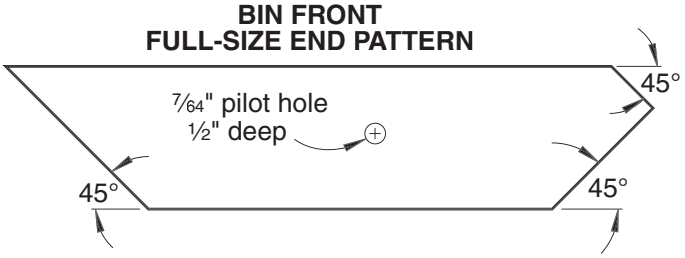
Entertainment Center, Page 42

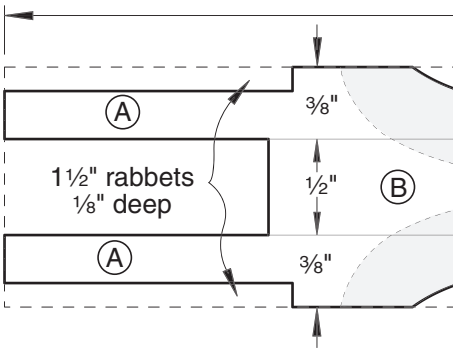


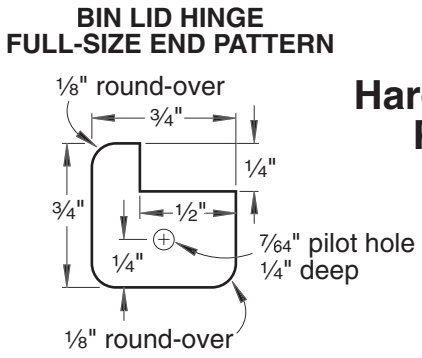
Trammel, Page 28



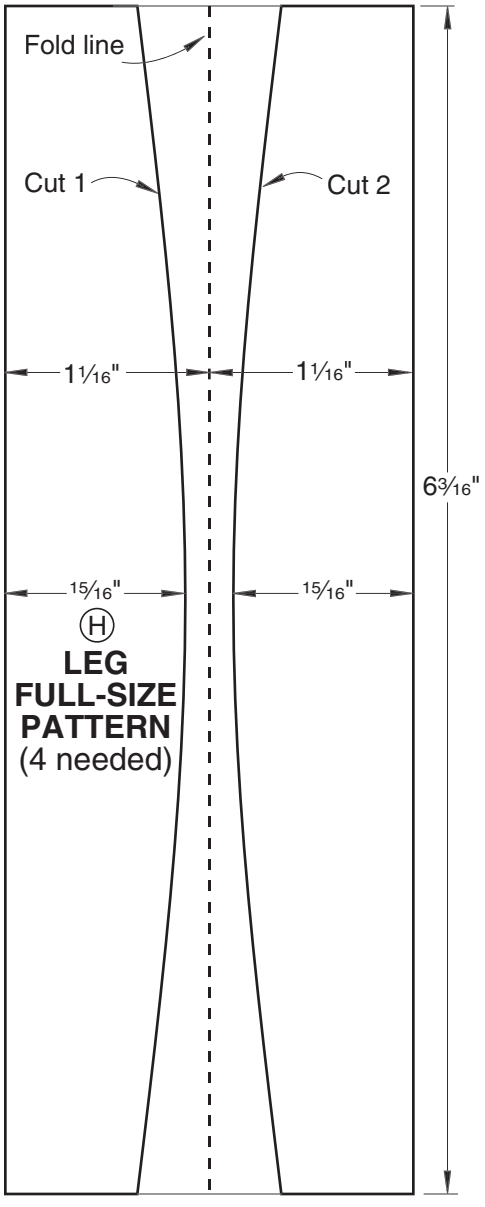
Hardware Bin, Page 94





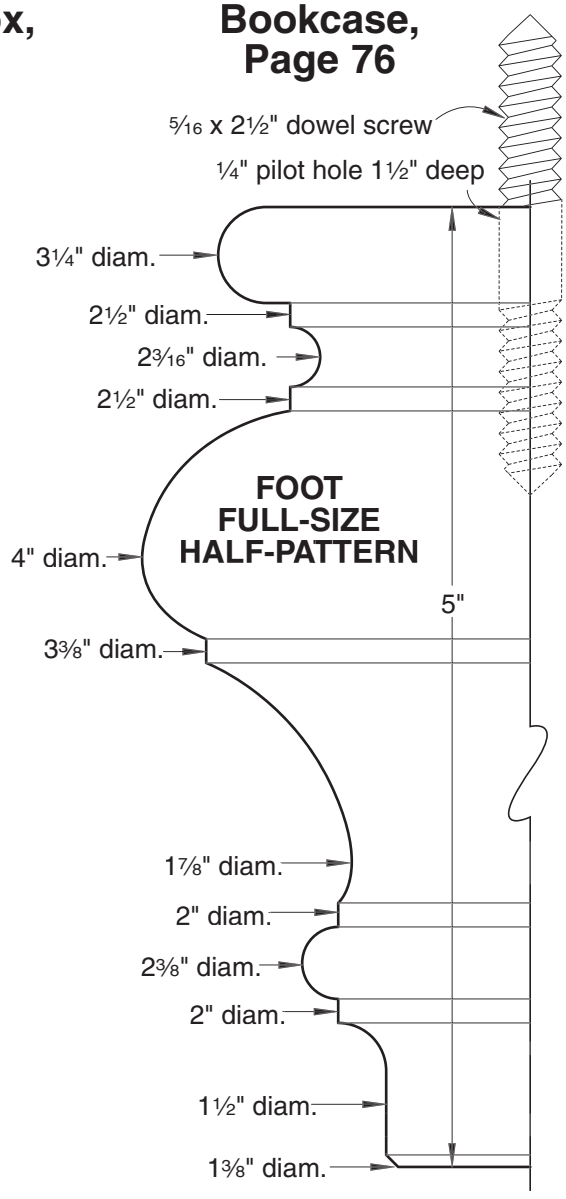


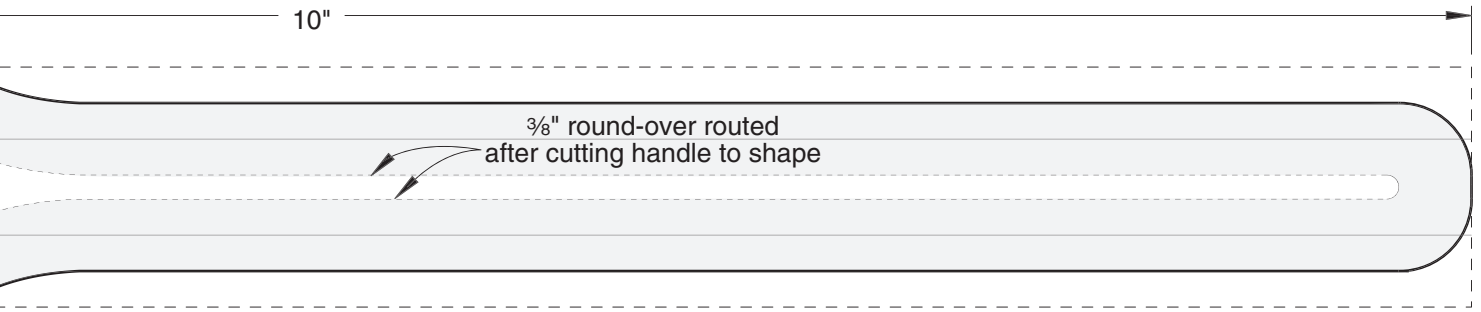
Hardware Bin, Page 94



Jewelry Box, Page 64

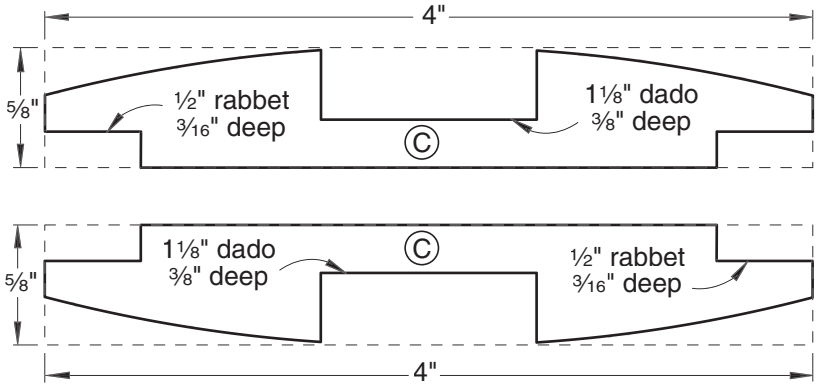
Bookcase, Page 76



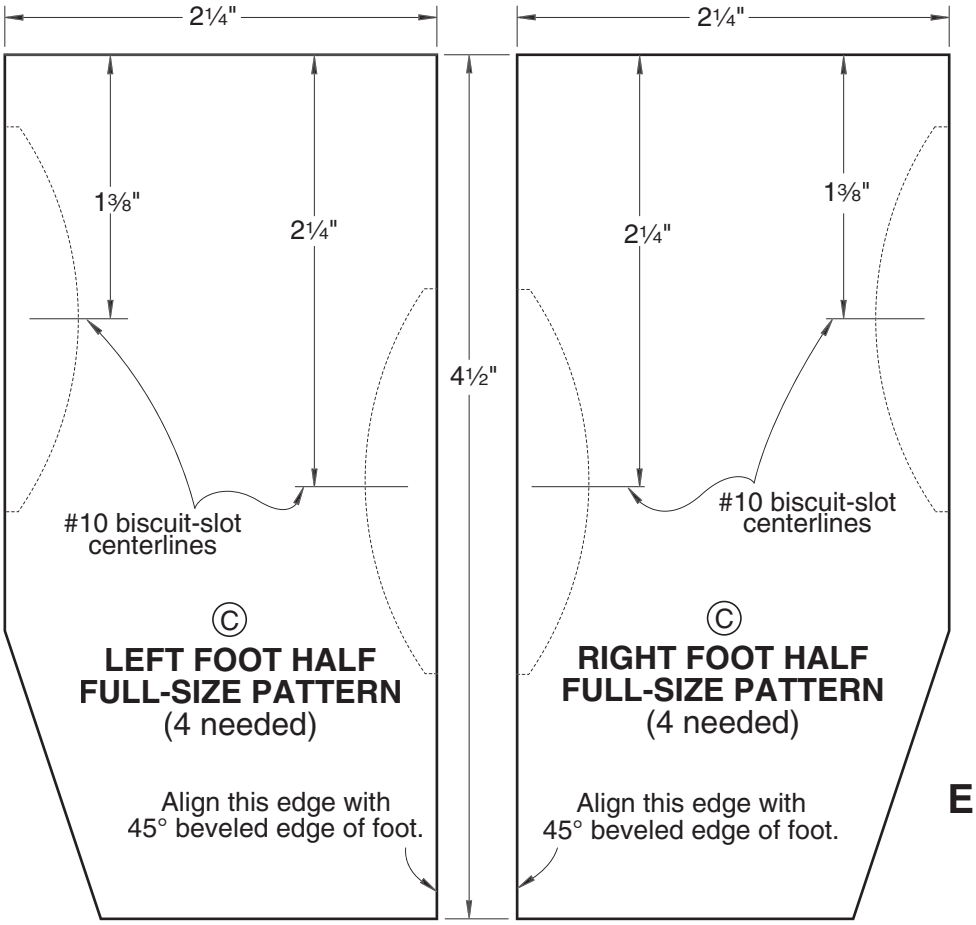


HANDLE FULL-SIZE SIDE PATTERN

Dead Blow Mallet, Page 52

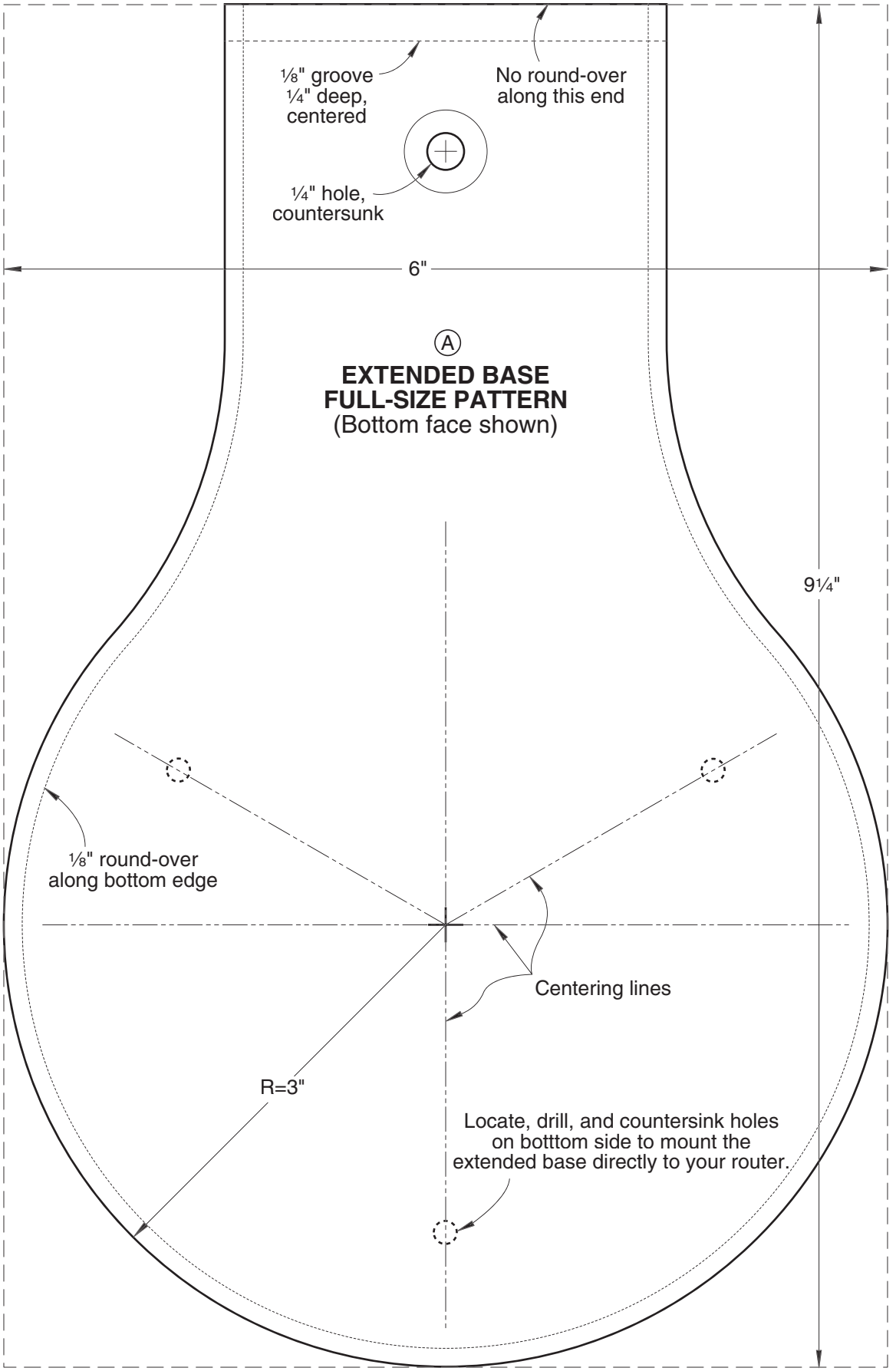


CAP FULL-SIZE PATTERN



Entertainment Center, Page 42

Trammel, Page 28



Stop tear-out while...

drilling

routing

sawing

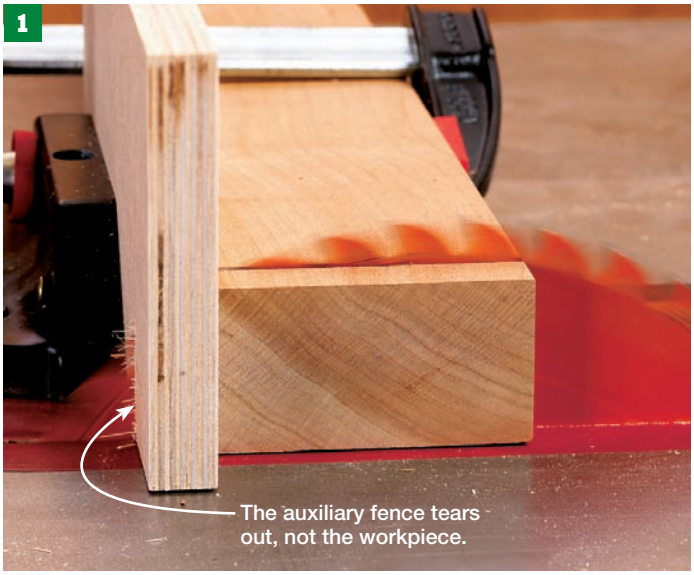
Build these safeguards into the way you work, and keep tear-out from tearing up a promising project.

Occasional splinters in your hand may be a fact of life in woodworking, but splintered wood is easy to avoid at your tablesaw, router, or drill press. Just make prevention of tear-out gremlins part of your most common woodworking routines.

Three ways to tame a tablesaw

Job one in any shop means establishing sound tablesaw habits. You've probably guessed some of the easy ones—aligning the rip fence parallel to the blade and using sharp carbide blades free of pitch buildup. Now add three more:

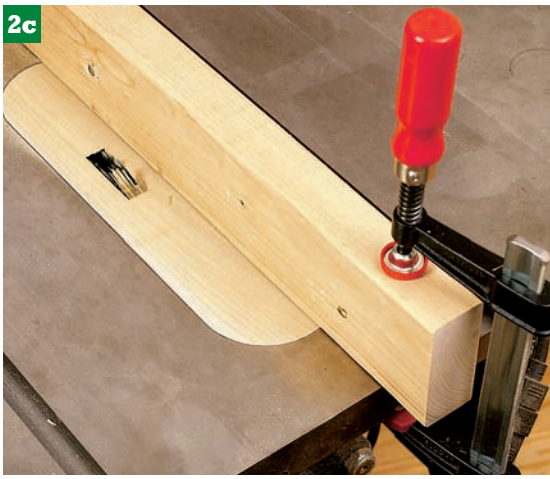
1 Use auxiliary fences to back up your crosscuts. Nearly all tablesaw miter gauges are machined to accept wood auxiliary fences via screw holes or slots, so get in the habit of stocking up on auxiliary fence blanks in different sizes. In addition to giving your workpieces wider support, these sacrificial fences prevent tear-out as the blade emerges from the back edge of the wood. Tear-out transfers to the fence instead of the workpiece, as shown in **Photo 1**. Any straight hardwood with parallel faces can function as fence material, as will Baltic birch plywood, or MDF.



Clamp your work firmly to an auxiliary miter-gauge fence to keep your blade from tearing out the back side of the cut.

This flush-trim bit's bearing follows the edge of the original tablesaw insert to help you cut a precise copy for a zero-clearance insert.

Use flathead wood screws to raise the zero-clearance insert flush with your saw table. A finger hole helps speed insert changes.



Position a 2×4 scrap to secure the blank insert as you raise the blade. Avoid covering the cut so you can see its progress.

2 Customize inexpensive inserts. Zero-clearance tablesaw inserts block tear-out from both standard and dado blades. There's just one big difference: Dado widths can vary, requiring zero-clearance inserts to match. You could invest a bundle in manufactured inserts if you have a half-dozen different dado widths you use regularly. But for a thriftier solution, make your own inserts for just pennies. Here's how:

To start, measure the thickness and width of your factory insert and plane your hardwood stock to that thickness. Rip stock to just wider than your insert, and cut blanks about ½" longer than the original insert

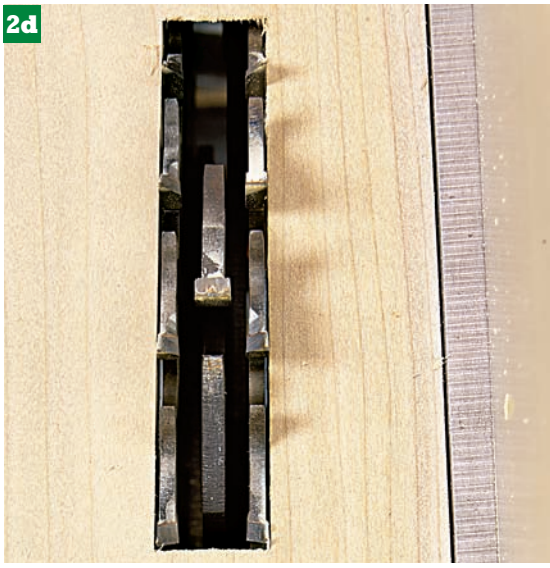
Using your factory insert as a pattern, trace around the stock. Then bandsaw the shape of the insert, leaving about 1/16" extra.

Next, center and attach the insert to the blank with double-faced tape. Fit your table-mounted router with a pattern or flush-trim bit so that the bearing rides on the factory insert's edge. Then use the insert as your pattern to rout away the remaining surplus, as shown in **Photo 2a**.

If your factory insert has a hold-down pin, insert a dowel of comparable diameter into the insert. For leveling feet, use #4 flathead wood screws shorter than the thickness of your insert, as shown in **Photo 2b**.

To break in a new insert, lower the blade completely and fit your saw with a fresh insert. Hold the blank insert in place by partially covering it with a piece of scrap secured by clamps, as shown in **Photo 2c**. Then slowly raise the dado blade until it's the approximate height of the dado you plan to make, as shown in **Photo 2d**. You can always raise the blade later to cut deeper dadoes.

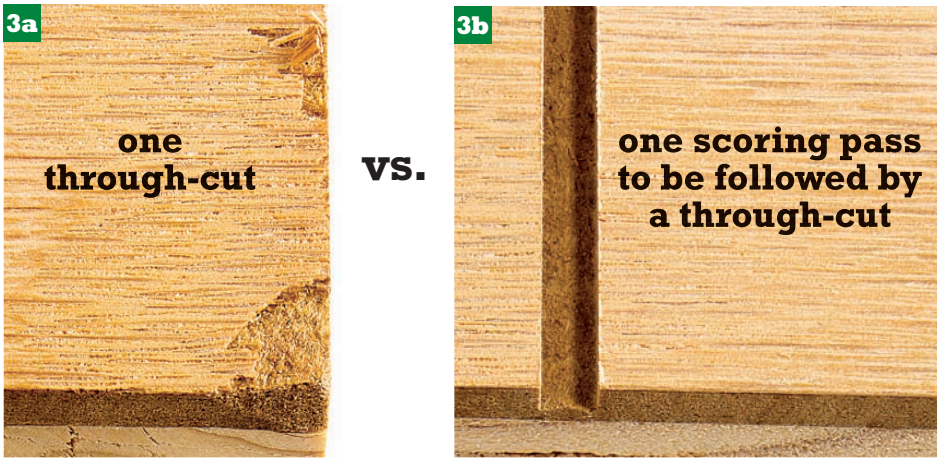
Once you're done, label the insert by dado blade width, and save it for future projects. Make it a habit to crank out blank tablesaw inserts in bulk so you'll have one available to fit every dado width.



A custom-made tablesaw insert prevents tear-out by keeping the blade from pulling wood fibers below the table surface.

3 Divide and conquer tear-out. If you treat all materials the same, some are bound to punish you for this bad habit. For instance, hardwood veneer plywood splinters instantly, as demonstrated by the one-pass crosscut shown in **Photo 3a**.

For tear-out-prone materials, including oak, ash, and panels veneered with melamine, start with a tablesaw equipped with a zero-clearance insert. Next, set your blade height to 1/16" so that the tips of the carbide teeth slice through the veneer and most of one ply of the panel, as shown in **Photo 3b**. Unlike cutting the panel in a single pass, the blade teeth in this shallow pass create less downward pull on the wood fibers. Then, reposition the panel, raise the blade, and complete the cut. The result: no tear-out.

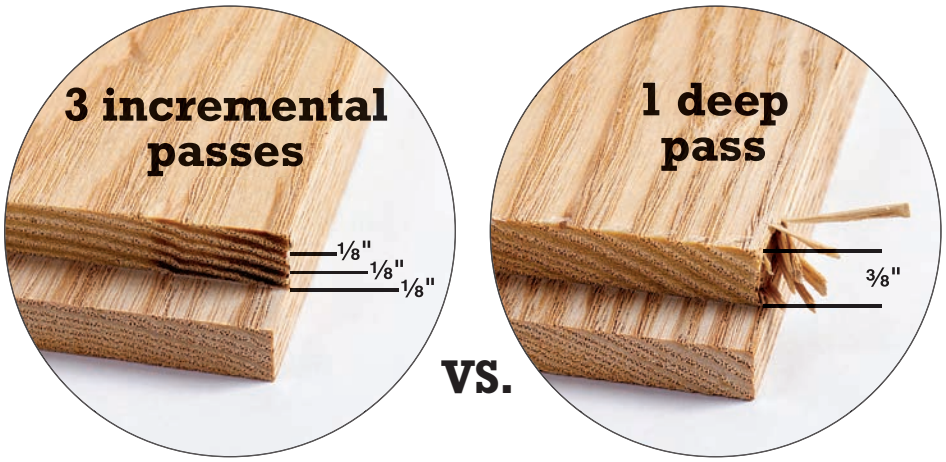


The oak veneer plywood sample on the left shows severe tear-out from crosscutting in a single pass. The sample on the right shows a 1/16"-deep starter cut that cleanly slices through the veneer. A second cut through the rest of the panel will leave a chip-free edge.

Three routes to cleaner routing

Whether you're making a no-frills dado or a decorative table edge, few shop tools match the versatility of routers. Carbide-edge bits will give you a head start toward preventing tear-out, but they don't last forever. Routing MDF and plywood can shorten the life of even the best quality bits, so resharpen or replace any that don't cut the way they once did. As with saw blades, periodically clean router bits with a specialty solvent, such as Empire Blade Saver. Now you're ready to master the techniques that complement your tools.

1 Light passes minimize tear-out. Carbide-tipped bits and high-horsepower routers may tempt you to make a habit of routing any profile on any type of wood in one pass. That's the quick way to produce tear-out, like the kind shown in the rabbeting cut on the *far right*. Shallow passes mean less chance of accidentally shredding an edge, so divide the cut into more manageable bites, like the ones used at *right*. Wood types prone to tear-out deserve especially careful handing. These include oak, ash, and some types of pine. Melamine-coated particleboard also benefits from shallow passes. If necessary, reduce your cutting depth to 3⁄32" per pass and slow down the feed rate.



Even without a backer board, dividing the cut into three passes of 1⁄8" each left smooth edges in the rabbet on the *left*. The 3⁄8" rabbet on the *right* was cut in a single pass with no backing.

2 Playing with blocks. Backing up your cuts makes as much sense when routing as when using a tablesaw. In both cases, you transfer the tear-out to a piece of scrap instead of your project parts. When routing, combine tear-out prevention with safety by using pushblocks to keep fingers a safe distance from spinning bits. With router pushblocks, because of the many different bit profiles, you need either lots of blocks or ways to reuse the same block. One solution: Make this sacrificial pushblock, shown at *right*, from a 4"-square piece of scrap that's been drilled to accept a dowel handle. Use it once, turn it 90°, and you have a fresh backing to use with your next bit, plus up to two more sides standing by. Make these blocks large enough and you can remove the chewed-up edges on your tablesaw and reuse them another four times. Larger blocks double as braces for keeping long workpieces perpendicular to your router table fence.

The profile in back shows this block has backed up one router bit already, but still has three more grain-supporting edges left.

3 Plan your passes. You may need to think through this cutting sequence the first few times, but you'll soon make it a habit after seeing the results. On workpieces where you're routing all four edges, don't just spin the workpiece and cut from edge to end and back again. Cut the ends first and then rout the edges. Edge grain near the ends is the most susceptible to tear-out, but cutting the ends first allows you to remove any damaged areas at the same time you rout the edges. The alternative? There is none. Cutting the edges first, as we did on the sample board shown at *right*, leaves profiles vulnerable to tear-out. If you're still having tear-out problems, use multiple passes and leave less than 1⁄32" of material for your final pass.

This tear-out could have been avoided by cutting the end-grain edges before cutting the edges that run with the grain.

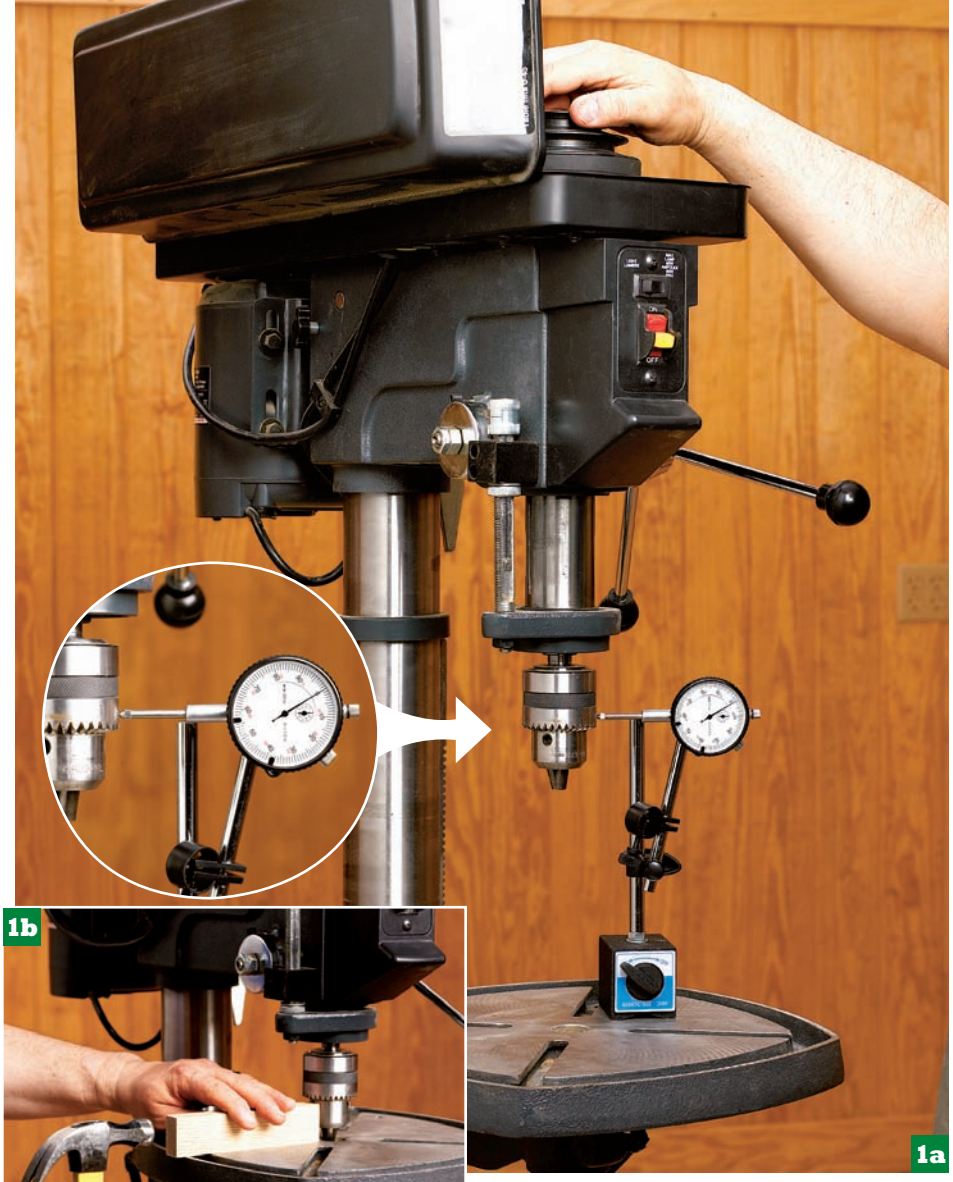
Two methods to keep your holes whole

Drill presses don't require much to make them free from tear-out. Start by choosing the best bits for the job: brad-point bits for holes up to ½", and Forstner bits for holes larger than that. Then spend a few minutes tuning up your drill press.

1 Work out the wobbles. Some woodworkers cultivate the right habits all for naught because their equipment isn't properly aligned. Drill presses can develop subtle alignment problems between the chuck and the quill, producing a wobble or runout in the bit that tears into your work.

Check for quill runout using a dial indicator, such as the one in **Photo 1a**. Place the end of the plunger against a smooth portion along the edge of the chuck. Unplug the drill press and turn the drive pulley by hand, watching the dial for indications of runout. Correct any variance beyond .003".

You can do that by first mounting a ½" drill bit with the shaft as far as possible inside the chuck. Turn the chuck by hand, again using the pulley. At the point where the chuck depresses the dial indicator's plunger the most, lightly tap the exposed portion of the bit shaft (not the flutes) using a hammer or dead-blow mallet and scrap block, as shown in **Photo 1b**. Rotate the chuck completely to check for any change. Increase the force of the impact until the chuck is seated dead-on and there's no runout, but avoid powerful strikes that might damage the shaft bearings. If the problem cannot be fixed this way, the drill press may have either a bent shaft or bearing problems that can only be corrected by a service technician.



1a

This dial indicator can detect quill and chuck runout as little as .001". The magnetic base holds it steady while you rotate the quill.

1b

Align the chuck with progressively harder taps against its lower portion using a piece of scrap and hammer.

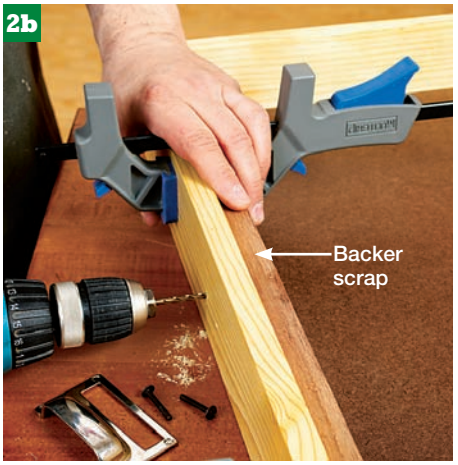
2 Back up your cuts. It's easy to place scrap stock under flat workpieces you'll drill completely through on your drill press table. The trick is following that advice when drilling oddly shaped pieces or objects that don't fit on your drill press.

To drill workpieces with curved surfaces, use scrap created when the piece was cut to shape, as was done on the arched part shown in **Photo 2a**. The underside of the arch was sanded after cutting, but it fits closely enough to prevent tear-out as the bit exits.

For work that doesn't lend itself to a drill press, clamp a backup scrap in place, as we did while drilling the drawer front shown in **Photo 2b**. Where clamping isn't an option, measure to find where the bit will exit the wood, and have a helper hold an oversize backer block in place as you drill.

2a

This curved piece of scrap needed to be raised on a thin piece of hardboard, but is still the perfect shape for backing up a hole being drilled through this curved workpiece.



2b

Scrap clamped to the inside of this drawer front prevents tear-out on the back surface. Bits that produce more dust than shavings need to be resharpened.

a gem of a jewelry box

Looking to craft a unique item to delight someone special? This stylish chest, made with eye-catching curly maple and wengé, is just the ticket. Though the project looks sophisticated, the construction's surprisingly simple, thanks to the straightforward dado, rabbet, and groove joinery, and a full-size pattern for quickly contouring the legs. Anxious to get started but need materials and/or hardware? Relax—you'll find a source for kits, listed at the end of this article, to get you quickly into the shop.

Start with the striking contrasting-wood case

1 To form a 5⁷⁄₁₆"-wide contrasting-wood blank for the case sides (A) and back (B), cut a 4⁷⁄₁₆×30" piece from ¾"-thick curly maple and a 1×30" piece from ¾"-thick wengé. (Feel free to use other woods of your choice.) Edge-glue the pieces together, keeping the faces and ends flush. Although a hard and dark wood, which contrasts nicely with the curly maple, wengé splinters and chips easily. To avoid these problems, see the **Shop Tips**, *opposite page*.

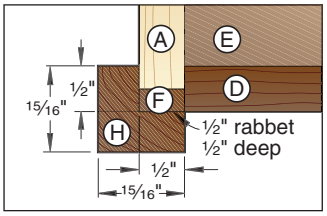
2 After the glue dries, scrape off the squeeze-out. Then joint one face, and plane the blank to ½" thick. Now crosscut the two 7½"-long sides (A) and 13"-long back (B) from the blank.

3 From ¾"-thick curly maple planed to ½" thick, cut the top front rail (C) to the size listed in the **Materials List**. Then, from ¾"-thick wengé planed to ½" thick, cut the bottom front rail (D) to size.

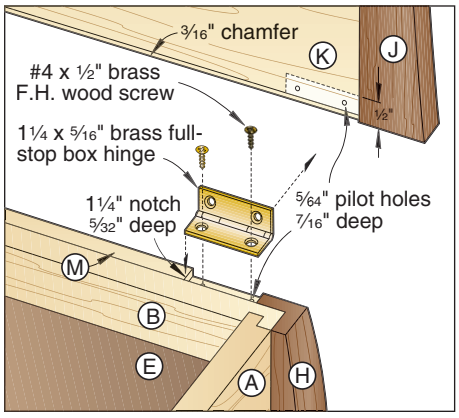
4 Using a standard ⅛"-kerf blade in your tablesaw, cut on the *inside* face of the sides (A), back (B), and top front rail (C) a ⅛" groove ¼" deep 1" from the *top* edge to fit your ⅛" hardboard for the top panel (E), where shown on **Drawing 1** and dimensioned on **Drawing 2**. Then cut the same size groove ¾" from the *bottom* edge of the sides, back, and bottom front rail (D), where shown, to receive the bottom panel (E). Now cut the two inner ⅛" grooves ¼" deep on the *inside* face of the sides only, where dimensioned on **Drawing 2**, to receive the ⅛" hardboard drawer runners (G), where shown on **Drawing 1**.

5 Fit your tablesaw with a ½" dado blade, and attach an auxiliary extension to the miter gauge and an auxiliary fence to the rip fence. Then cut a ¼"-deep rabbet across both ends of the back (B), top front rail (C), and bottom front rail (D) on the *inside* faces,

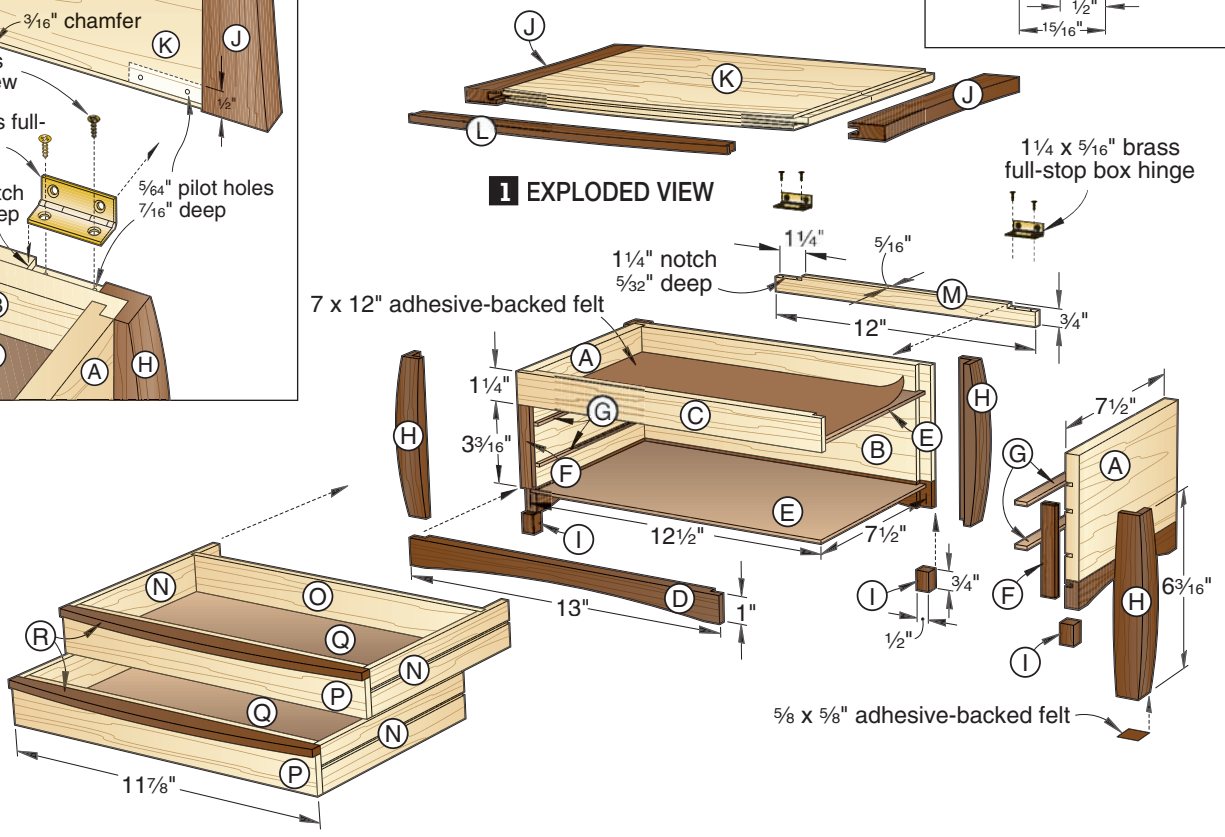
1a LEG DETAIL SECTION VIEW (Through center of leg)



1b HINGE MOUNTING DETAIL



1 EXPLODED VIEW



SHOP TIPS

How to work successfully with wengé

Wengé (pronounced *when-gay*), an exotic wood from equatorial Africa, has a beautifully straight but coarse grain structure that makes it prone to splintering and chipping if you don't take these precautions while working with it:

- Check the ends of the stock for cracks before cutting it. Look carefully because the dark coffee color makes it difficult to see defects. Depending on the extent and location of any cracks found, you may need to select another workpiece. Although the fine, black veins that run through the wood can look like cracks, don't jump to conclusions. If you don't see cracks, the wood is likely okay.
- For the cleanest cuts, use sharp carbide-tipped blades and bits and a zero-clearance insert. Be sure to back up all cuts with scrap to avoid splintering and splitting, such as that shown at *right*.
- Ease all edges by lightly sanding with 220-grit sandpaper.
- When bandsawing contours to shape, stay at least 1⁄16" away from the marked cutlines, and then sand to the lines.
- After crosscutting, remove any whiskers from the ends of the wood with sandpaper rather than your fingers. This will avoid additional splintering and prevent possible skin irritation as well.
- When sanding, start with 150 grit and work up to finer grits. Starting with a coarser grit creates scratches that take more sanding to remove.

where shown on **Drawing 2**, to receive the sides (A).

***Note**: If your dado blade does not produce a clean, flat-bottomed surface, cut the rabbets a hair less than ¼" deep. Then sand them smooth and to final depth using a block of wood wrapped with 150-grit sandpaper. This will ensure tight case joints that are visible with the lid open. You also can use this technique when cutting the rabbets in the legs (H).*

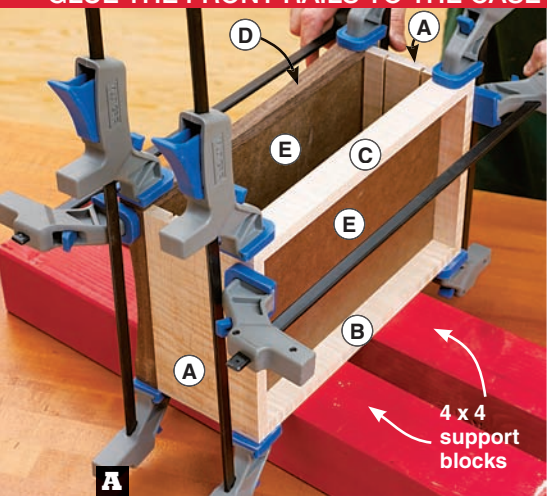
6 Mark the centers and ends of the curves along the bottom edges of the sides (A), back (B), and bottom front rail (D), where dimensioned on **Drawing 2**. Bending a fairing stick to the marked points, draw the curves. Then bandsaw and sand the curves to shape. (For a free fairing stick plan, go to woodmagazine.com/fairing.)

7 From ⅛" hardboard, cut the top and bottom panels (E) to 7½×12½". Then, from ¾"-thick wengé resawn or planed to ¼" thick, cut the two front fillers (F) to ½×3³⁄₁₆".

8 Dry-assemble and clamp together the sides (A), back (B), top and bottom front rails (C, D), top and bottom panels (E), and front fillers (F), and verify the parts fit together correctly. Disassemble the case, and make any needed adjustments.

9 Apply glue to the rabbets in the back (B). Assemble the sides (A) to the back with the top and bottom edges flush. Then slide the top and bottom panels (E) into the grooves to square the assembly, and clamp it together. Next, glue and clamp the top and bottom front rails (C, D) to the case, as shown in **Photo A**, flush with the top and bottom edges of the sides (A). After the glue dries, glue and clamp the front fillers (F) in position, where shown on **Drawing 1**, flush with the outside faces of the sides.

GLUE THE FRONT RAILS TO THE CASE



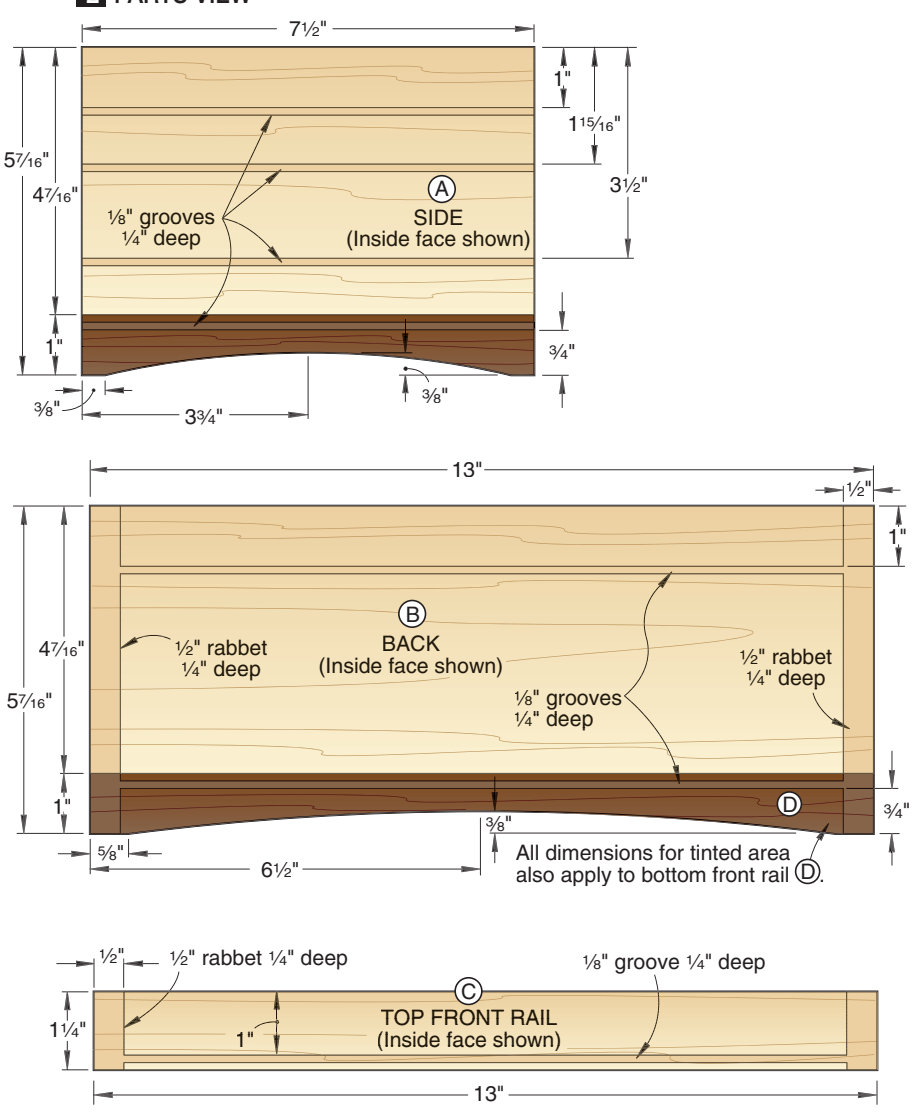
With the case on 4×4 support blocks for clamp clearance, glue and clamp the top and bottom front rails (C, D) to the sides (A).

10 From ⅛" hardboard, cut the four drawer runners (G) to size to fit the grooves in the sides (A). Insert the runners in the grooves without glue for now.

Next up: the shapely legs and leg fillers

1 From ¾"-thick wengé, cut two 1¹⁄₁₆×28" pieces to form a blank for the legs (H).

2 PARTS VIEW



SHOP TIP

Bandsaw small parts safely using a guide block

To keep fingers out of harm's way and maintain safe control when bandsawing small parts, double-face-tape a guide block at least 3" wide and of suitable thickness and length to the parts. Using a jewelry box leg (H) as an example, cut a 3×6³⁄₁₆" piece from ½"-thick scrap or plywood. Tape the piece to the leg rabbet. Then, holding the guide, bandsaw the leg to shape, as shown at *right*.

Laminate the pieces together. Then plane the blank to 1 1/16" thick. Using a dado blade in your tablesaw, cut a 1/2" rabbet 1/2" deep along the blank, where shown on **Drawing 1a**.

2 Crosscut the blank to form four 6 3/16"-long legs. Next, make four copies of the leg full-size pattern from the *WOOD Patterns®* insert. Spray-adhere a pattern to the *outside* faces of each leg, folding the pattern where shown.

3 With a leg positioned with the "Cut 1" side of the pattern faceup and using a guide block for safety, as explained in the **Shop Tip**, *opposite page, bottom*, bandsaw and sand to the curved pattern line. Reattach the cutoff to the leg with double-faced tape. Then reposition the leg on the guide block with the "Cut 2" side of the pattern up. Bandsaw and sand to shape. Remove the attached cutoff and tape. Repeat to shape the remaining legs.

4 Test-fit the legs on the case, and verify tight-fitting joints. Then, to glue the legs in place, flush with the case top edge, where shown on **Drawing 1**, position the case on a flat worksurface with the top edge down. Now glue and band-clamp the legs to the case, flush with the worksurface.

5 From 3/4"-thick wengé planed to 1/2" thick, cut a 1/2×8" workpiece to form the leg fillers (I). Crosscut four 3/4"-long fillers from the piece. Now glue and clamp the fillers to the inside of the legs (H), tight against the bottom edges of the case.

Make the beautiful lid, and hinge it to the case

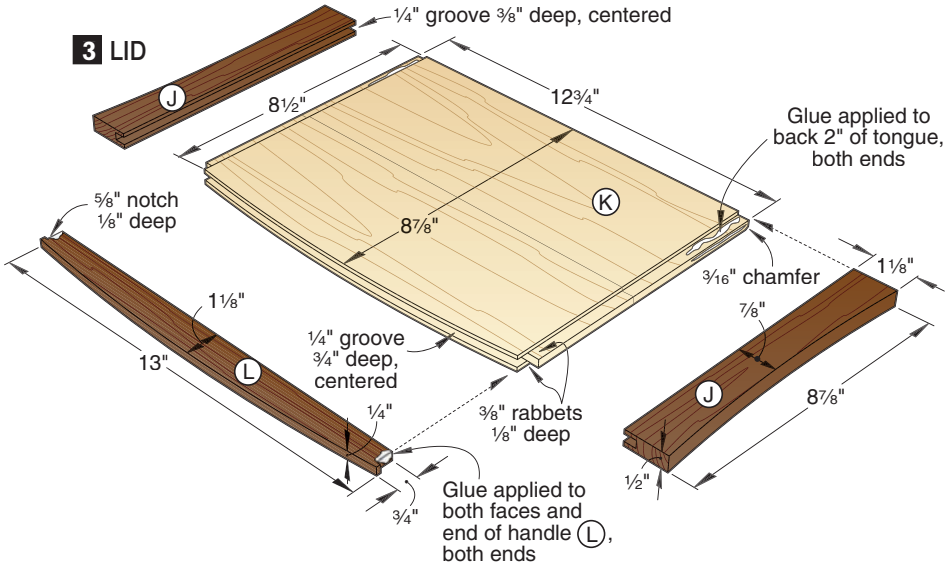
1 From 3/4"-thick wengé planed to 1/2" thick, cut the breadboard ends (J) for the lid panel (K) to size.

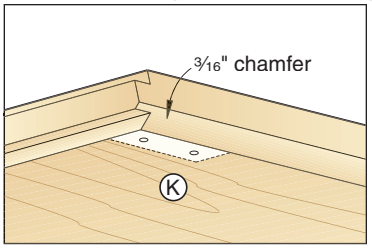
2 Edge-join 3/4"-thick curly maple to form a 9 3/8×13 1/2" blank for the lid panel (K). After the glue dries, scrape off the squeeze-out. Plane the lid panel to 1/2" thick. Now crosscut and rip the panel to the finished size of 8 7/8×12 3/4". Sand the panel to 220 grit.

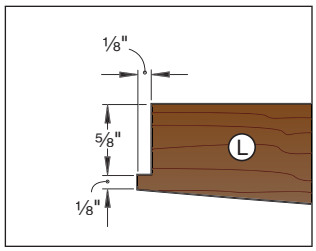
3 Using a dado blade in your tablesaw and a zero-clearance insert, cut a centered 1/4" groove 3/8" deep along the *inside* edge of the breadboard ends (J), where shown on **Drawing 3**. Raise the blade to 3/4". Now cut a centered groove along the *front* edge of the panel (K) to receive the handle (L).

4 Adjust your dado blade. Then cut 3/8" rabbets 1/8" deep on each end of the panel (K), forming 1/4" tongues 3/8" long to fit the grooves in the breadboard ends (J).

5 Chuck a 45° chamfer bit in your table-mounted router. Then rout a 3/16" chamfer along the back bottom edge of the panel (K), where shown on **Drawings 3** and **3a**. (The chamfer provides clearance for the knuckles of the lid hinges.)





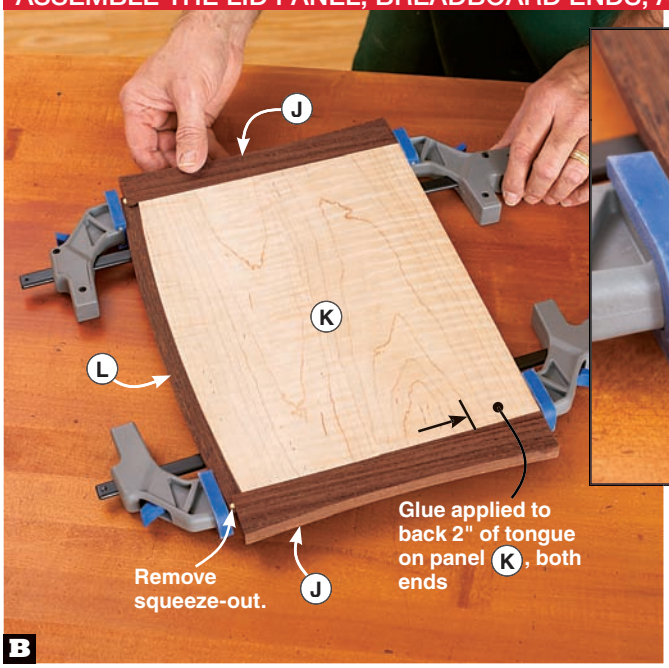


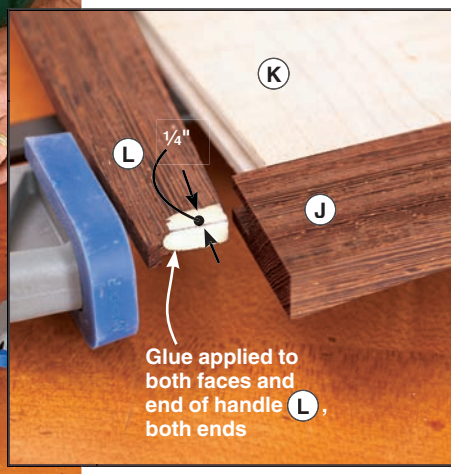
6 Draw the curves along the *outside* edges of the breadboard ends (J) and along the *front* edge of the panel (K), where dimensioned on **Drawing 3**. Then bandsaw and sand the curves to shape.

7 From 3/4"-thick wengé resawn or planed to 1/4" thick to fit the groove in the panel (K), cut the handle (L) to size. Lay out a 5/8" notch 1/8" deep at each end of the handle and draw the curve along the *front* edge, where dimensioned on **Drawings 3** and **3b**. Cut the notches using a fine-tooth handsaw. Then bandsaw and sand the curve to shape.

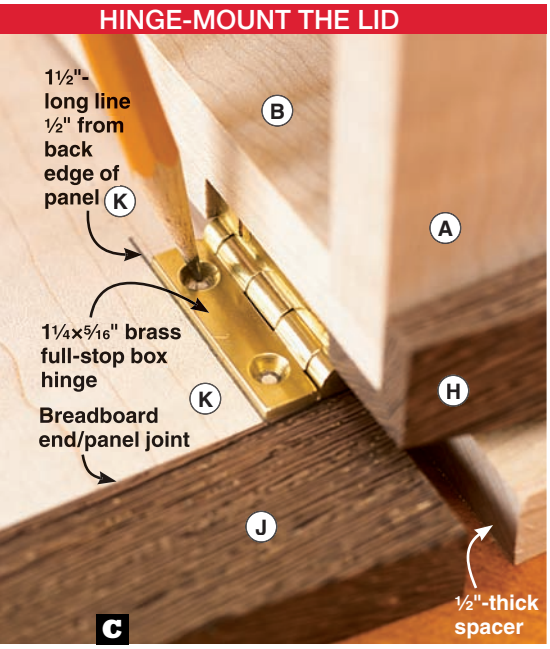
8 To assemble the lid, apply glue to only the back 2" of the tongues on the panel (K) and the areas on the notched ends of the handle (L), as shown in **Photo B**. (Gluing in this manner allows the panel to move freely

ASSEMBLE THE LID PANEL, BREADBOARD ENDS, AND HANDLE

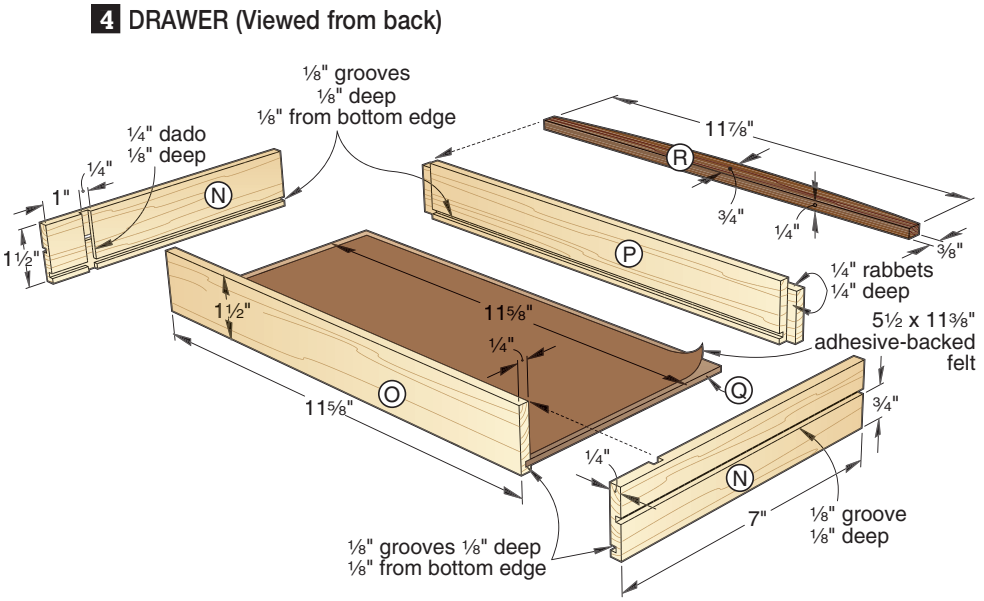




With glue applied only to the areas on the panel (K) and handle (L) where shown, assemble the lid and clamp it together.



Align the case hinges with the marked lines on the lid panel (K) and the breadboard end (J) and panel joints. Mark the mounting holes.



at the front. A ⅛" gap between the handle and the bottom of the groove in the panel accommodates the panel movement.) Now assemble the breadboard ends (J) on the panel, flush at the back; install the handle; and clamp the assembly together, as shown. Remove the squeeze-out.

9 From ¾"-thick curly maple resawn or planed to 5⁄16" thick, cut the hinge support (M) to size to fit between the rear legs (H), where shown on **Drawings 1** and **1b**. Lay out the 1¼" notches 5⁄32" deep for the 1¼x5⁄16" brass full-stop box hinges on the ends of the support, where shown. Bandsaw and sand the notches smooth. Then, with the notches up, glue and clamp the support to the back (B), flush with the top edge.

10 Position the hinges in the notches, where shown on **Drawing 1b**, and mark the center of the mounting holes. Drill pilot holes, and prethread the holes with a #4x½" steel flathead wood screw. (This prevents breaking the soft brass screws.) Lubricate #4x½" brass flathead wood screws with paraffin wax. Now drive the screws to secure the hinges. Note that when closed, the hinges sit about 1⁄32" proud of the top edge of the hinge support. This prevents hinge binding so the lid will close flat.

11 To hinge-mount the lid (J/K/L) to the case, where shown on **Drawing 1b**, draw lines for hinge alignment on the *bottom* face of the panel (K). Starting at the joint between each breadboard end (J) and the panel, draw a 1½"-long line ½" from the panel *back* edge toward the center.

Next, with the case positioned with the back (B) on a ½"-thick spacer, align the hinges with the marked lines on the panel and breadboard end/panel joints, as shown in **Photo C**. (If the outside edges of your hinges don't exactly align with the joints, simply center the lid side-to-side.) Mark the mounting holes, and then drill pilot holes. Sand off the marked lines. Now drive the screws to attach the lid, prethreading the holes as before.

Now let's build a pair of fitting drawers

1 From ¾"-thick maple resawn or planed to ¼" thick, cut four 1½x10" pieces for the drawer sides (N) and two 1½x11⅝" pieces for the backs (O). Crosscut the drawer sides to the finished length of 7", saving the cutoffs. You'll use these for making test-groove cuts to correctly position the drawers on the drawer runners (G) in the case.

2 From ¾"-thick curly maple planed to ½" thick, cut the fronts (P) to size.

3 Using a standard blade in your tablesaw, cut a ⅛" groove ⅛" deep ⅛" from the *bottom* edge of the sides (N), backs (O), and fronts (P) to fit your ⅛" hardboard for the bottoms (Q), where shown on **Drawing 4**. Switch to a ¼" dado blade. Then cut a ⅛"-deep dado on the *inside* face of the sides (N), where dimensioned, to fit the backs (O). Now cut a ¼" rabbet ¼" deep on the *inside* face of the fronts (P) at both ends to fit the sides and along the *top* edge on the *outside* face to receive the handles (R).

4 To establish a 1⁄16" reveal between the drawers and the case at the top and bottom, cut a ⅛" groove ⅛" deep ¾" from the *bottom* edge of a drawer-side cutoff, where dimensioned on **Drawing 4**. Position the cutoff in the case with a bottom drawer runner

SHOP TIP

Nickels serve as handy spacers

Using a ruler to check for 1⁄16" spacing between parts, such as the jewelry box drawers, can be cumbersome. Here's an easy way to establish uniform reveals without measuring. Simply place nickels, which measure a smidgen over 1⁄16" thick, between the parts to set the spacing, as shown.

Nickels evenly space parts, such as the jewelry box drawer-side cutoffs, about 1⁄16" apart.

(G) in the groove, and check for a 1/16" reveal at the bottom. For an easy way to set the spacing, see the **Shop Tip**, *opposite page, bottom*. If necessary, adjust your setup. Then cut the grooves on the *outside* faces of two drawer sides (N). Mark the bottom edges and identify the parts as "bottom" to ensure correct orientation during drawer assembly and location of the drawer in the case.

5 Position one of the bottom sides (N) in the case. Then position the grooved cutoff above it. Check for 1/16" clearance below and above the cutoff. Again, adjust your setup if needed. Then cut the 1/8" grooves in the remaining side pieces. Mark the bottom edges, and identify the parts as "top."

6 From 1/8" hardboard, cut the drawer bottoms (Q) to 5¾×11⅝". Sand all of the drawer parts, except the hardboard, to 220 grit. Then glue and clamp the drawers together, verifying correct orientation of the sides (N) and checking for square.

7 From ¾"-thick wengé resawn or planed to ¼" thick, cut the handles (R) to size. Mark the curve on the handles, where dimensioned on **Drawing 4**. Bandsaw and sand the handles to shape. Then glue and clamp them to the rabbets in the drawer fronts (P), keeping the ends flush.

8 Noting the marked locations, slide the drawers into the case. Check for an equal 1/16" reveal on each side of the drawers, and verify they slide freely, but without looseness. If needed, remove the drawer runners (G), and sand them or cut new ones to achieve the desired fit. Then glue the runners in place in the case grooves.

Time to apply the finish and install the felt

1 Remove the lid, hinges, and drawers from the case. Sand any areas that need it to 220 grit, and remove the dust. Then apply a clear finish of your choice. To make the figure in the curly maple pop, see the sidebar, "A great finish for fancy-grain figured woods," *above*.

2 Cut pieces of adhesive-backed felt (we used a brown color) to fit the top panel (E) and bottom of the legs (H), where shown on **Drawing 1**, and the drawer bottoms (Q), where shown on **Drawing 4**. Remove the backing, and press the felt pieces into place.

3 Finally, reattach the lid and slide in the drawers. Now, head for a jewelry store, pick out a nice item for the box, and surprise a lucky recipient with your thoughtfulness and handiwork.

A great finish for fancy-grain figured woods

You don't need to use an elaborate finishing technique to bring out the prized grain in figured woods, such as the curly maple for the jewelry box. Here's a simple process Master Craftsman Chuck Hedlund uses to achieve eye-catching results.

Liberally apply a coat of boiled linseed oil to the wood, and after 10 minutes wipe off the excess with a clean cloth. Because the various portions of figure absorb the oil at different rates, it enhances the contrast. Let the oil dry for at least a week. Then apply four *light* coats of a clear finish, such as Deft aerosol lacquer Semigloss Clear Wood Finish, sanding to 320 grit between the first three coats and 400 grit before the final coat. (We used a lacquer finish because it dries fast and sands easily.) Spraying light coats avoids runs, sags, and an "orange peel" appearance.

Written by **Owen Duvall** with **Chuck Hedlund**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

Case		FINISHED SIZE T	W	L	Matl.	Qty.
A*	sides	½"	5 7/16"	7½"	EM/W	2
B*	back	½"	5 7/16"	13"	EM/W	1
C	top front rail	½"	1¼"	13"	CM	1
D	bottom front rail	½"	1"	13"	W	1
E	top and bottom panels	⅛"	7½"	12½"	H	2
F	front fillers	¼"	½"	3 3/16"	W	2
G	drawer runners	⅛"	7/16"	7¼"	H	4
H*	legs	15/16"	15/16"	6 3/16"	LW	4
I*	leg fillers	½"	½"	¾"	W	4
Lid						
J	breadboard ends	½"	1⅛"	8⅞"	W	2
K*	panel	½"	8⅞"	12¾"	ECM	1
L	handle	¼"	1⅛"	13"	W	1
M	hinge support	5/16"	¾"	12"	CM	1
Drawers (2 needed)						
N*	sides	¼"	1½"	7"	M	4
O	backs	¼"	1½"	11⅝"	M	2
P	fronts	½"	1½"	11⅞"	CM	2
Q	bottoms	⅛"	5¾"	11⅝"	H	2
R	handles	¼"	¾"	11⅞"	W	2

*Parts initially cut oversize. See the instructions.

Materials key: EM/W–edge-joined curly maple and wengé, CM–curly maple, W–wengé, H–hardboard, LW–laminated wengé, ECM–edge-joined curly maple, M–maple.

Supplies: Spray adhesive; cloth-backed double-faced tape; #4×½" steel flathead wood screw (1) and #4×½" brass flathead wood screws (8); paraffin wax; 9×12" adhesive-backed brown felt (3), available at craft and fabric supply stores, such as Michaels and Jo-Ann.

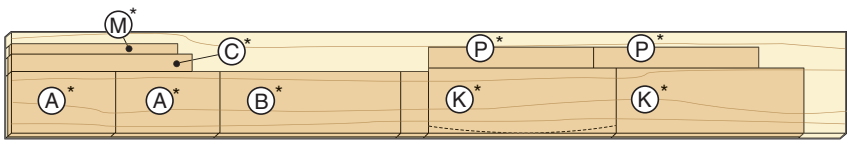
Blade and bit: Dado-blade set, 45° chamfer router bit.

Sources

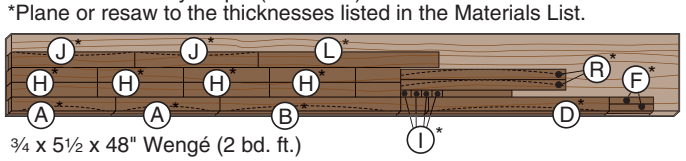
Hinges: 1¼x5/16" full-stop box hinges (1 pr.) no. 01B03.02, $17.90 plus shipping. Call or click Lee Valley, 800/871-8158; leevalley.com.

Kits: For hardware and lumber/hardware kits for the jewelry box, call or click Heritage Building Specialties, 800/524-4184; heritagewood.com.

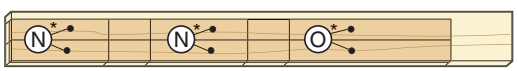
Cutting Diagram



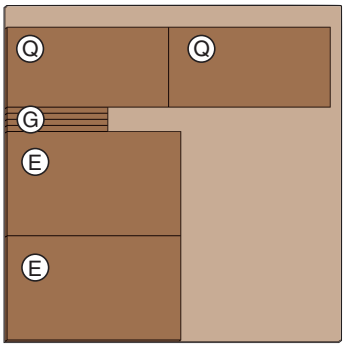
¾ x 7¼ x 60" Curly maple (3.3 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



¾ x 5½ x 48" Wengé (2 bd. ft.)



¾ x 3½ x 36" Maple (1 bd. ft.)

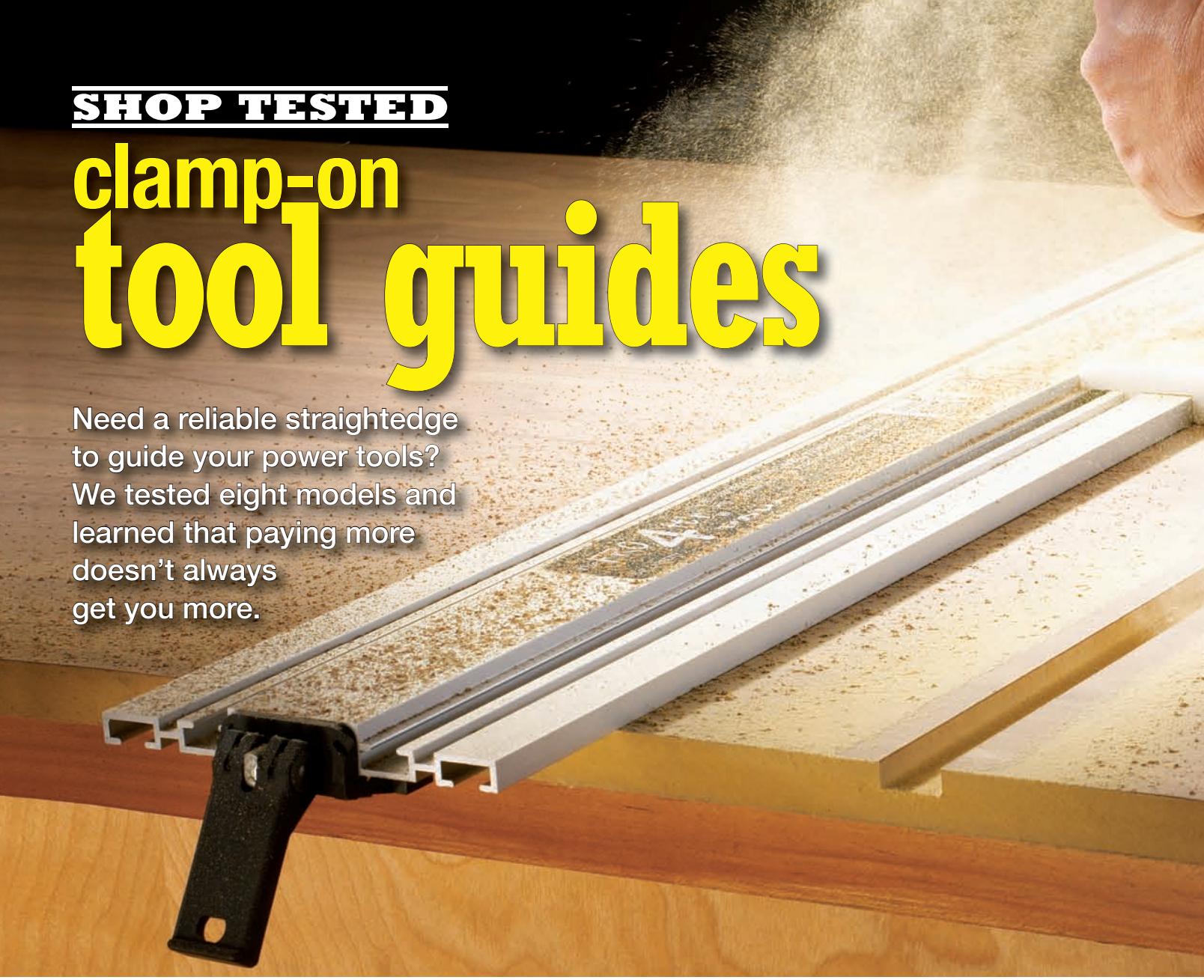


⅛ x 24 x 24" Hardboard

SHOP TESTED

clamp-on tool guides

Need a reliable straightedge to guide your power tools? We tested eight models and learned that paying more doesn't always get you more.



Since its debut in 1982, Griset Industries' Tru-Grip Clamp 'N Tool Guide has been king of the clamp-on-straightedge hill. Because of that success, more manufacturers have entered the fray and now at least eight different models compete for your time, attention, and tool-buying budget. With prices for the basic guide ranging from $35 to $140 (not including accessories that can add $100 or more to the cost), we decided to compare features and performance. Here's the straight scoop.

Why would you want one?

A clamp-on tool guide's essential duty is to provide a straight and convenient edge for guiding your router (to cut shelf dadoes in a bookcase, for example) or circular saw (breaking down sheet goods into manageable sizes). Once you have one in your shop, you'll find many other uses: straightening one edge of a crooked board, or as a quick and easy bandsaw fence. Some models can even be used as bar clamps. For purposes of this article, we'll focus on each model's performance while routing.

Three components; three key performance areas

Clamp-on tool guides typically consist of:

- an extruded aluminum rail
- clamps to secure that rail to the workpiece
- a carriage/subbase assembly (usually optional) that rides the rail with your router or circ saw mounted to it

Our advice: Pay the extra money for the carriage/subbase, if you can, for two reasons. First, the router can't stray from the rail whether by dust buildup or operator error. And, we found the rails deflected less because we pushed only parallel to the rail, not against it. (EZ Smart's SRS50 and Tool Trolley's Converter Router Trolley package a carriage/subbase with the rail; however, clamps are not included with Router Trolley.)

Here's what to look for in each of these three components:

- ***A rigid rail.*** Most of the tested models come with at least one rail capable of working a 48"-wide or -long workpiece. In our deflection test—applying 10 pounds of sideways pressure against the center of the rail—the best rails bowed only .001" (EZ Smart); the worst, .037", or about 1/32" (All-In-One). We found that range acceptable.

To machine workpieces longer or wider, you must either join another rail onto the end of the first or switch to a longer version of the same guide. Two-piece rails are inherently weaker at that joint, generally resulting in more deflection (Router Trolley's rail bowed .130"—more than 1/8"—at the center of an 8' cut) unless supported as shown at *far right*.

TWO BASIC GUIDE-CLAMP STYLES

Most guides grip the workpiece top to bottom, like the C-style clamps on the Pro-Gold Multi-Guide (*left*). These can mar the bottom of your workpiece if overtightened. Edge-gripping clamps like those on the Tru-Grip Clamp 'N Tool Guide (*right*) hold snugly by depressing the cammed locking lever, and are nearly impossible to overtighten.

The only one-piece 8' rail (Tru-Grip Pro) deflected the least (only .010"), but proved more cumbersome to store and transport.

■ ***Convenient clamps.*** Most of the clamps wrap around the edges of a workpiece, bearing against its bottom, as shown *top right*. That means the clamps must overhang your bench. And, for narrower pieces, you must somehow elevate the workpiece off your worksurface. We prefer the edge-gripping design of the Tru-Grip and All-In-One guides that have only the locking-lever edge overhanging (*top right* photos). These guides also lock quickly and positively, accommodate virtually any workpiece thickness without adjustment, and can even pinch-hit as bar clamps at glue-up time.

Guides with wraparound clamps do have one advantage over edge-gripping guides, though: The rail needn't be installed perpendicular to the edge, so you can mount it diagonally. (Edge-gripping guides don't self-square, but can stray only a few degrees from perpendicular to the edge.)

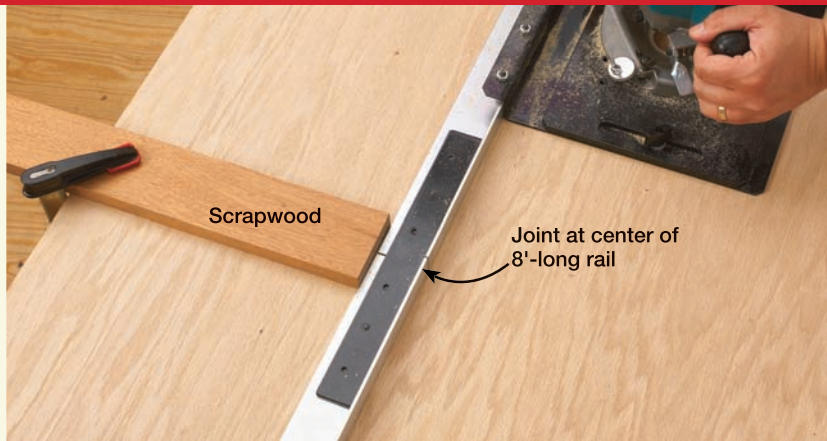
■ ***A stay-on-course carriage.*** Here's where we found the most differences in these guides. For example, the Pro-Gold Multi-Guide doesn't provide or offer a carriage/subbase, while the elaborate EZ Smart has a sliding carriage arm that travels parallel *or* 6½" perpendicular to the rail. (With this feature, you can position the rail approximately, then move the router bit precisely to your cutline. You can do the same thing over a shorter range—3¾"—with Router Trolley's slotted subbase.)

Three of the guides (All-In-One and both Tru-Grips) offer a simple subbase, which replaces your router's subbase, integrated with a carriage that form-fits the rail. Although not as versatile as EZ Smart or Router Trolley, we like the simple effectiveness of this configuration. Hartville Tool's optional carriage, to which you must add your own ¼"-thick subbase, is similar, but the carriage is *captured* on the rail. That means you can't just drop the carriage onto the rail anywhere along its length; it can only be installed or removed from the end of the rail—a nuisance, in our book.

The two remaining guides use ball bearings (Penn State PPS2) or nylon bushings (Tool Trolley) to control the fit between the carriage and the rail. (We found this method no more or less accurate at guiding the tool than the other carriages in our test.) However, the rectangular subbase on the Tool Trolley can double as a router-table insert plate, so you can swap your router from the table to the tool guide without hassle.

CLAMP A SCRAP TO DEFEAT DEFLECTION

Back up a two-piece rail with a piece of scrapwood clamped against the joint. This additional support keeps the rail from bending in the middle during a long cut.



THE COMPLETE LOWDOWN ON EIGHT CLAMP-ON TOOL GUIDES

BRAND	E. Emerson Tool Co.	EZ Smart	Hartville Tool
MODEL	All-In-One	Smart Router System SRS50	Red Line
CARRIAGE MOUNTING STYLE	Noncaptured	Noncaptured	Captured
LOSS OF CUTTING DEPTH TO SUBBASE	11/64"	1/8"	1/4"
RAIL MOUNTING METHOD	Edge grip with cam-lever clamp	Wraparound with screw clamp	Wraparound with cam-lever clamp
MAXIMUM WORKPIECE THICKNESS	Unlimited	2 1/4"	1 1/16"
CAN GUIDE BE USED AS A BAR CLAMP?	Yes	No	No
GUIDE TYPE FOR LONG WORKPIECES (OVER 48")	Cannot clamp longer than 50"	Butt-joined short rails	Butt-joined short rails
PERFORMANCE RATINGS (1) LACK OF DEFLECTION AT CENTER OF 4' GUIDE	C	A	A
LACK OF DEFLECTION AT CENTER OF 8' GUIDE	Not sold in 8' length	A	B
EASE OF CARRIAGE TRAVEL	Smooth	Smooth	Smooth
	A	A	A
EASE OF MOUNTING RAIL TO WORKPIECE	Slide movable jaw against workpiece, then flip the locking lever.	Clamps can't slide out accidentally, but must extend past rail to fit a 48" workpiece.	Cam lever is faster than threaded clamps, but clamps can accidentally slide out of rail.
	A	B	B
LACK OF WORKPIECE MARRING	A	A	A
DURABILITY (lack of carriage/subbase damage from 4' drop to concrete floor)	One corner dinged; needed repair to fit on rail.	No damage apparent	No damage apparent
	B	A	A
PERFORMANCE SUMMARY	Similar in appearance to Tru-Grip Clamp 'N Tool Guide, but this guide demonstrated higher deflection measurements. A large number of rail-mounted accessories (including a pocket-hole jig and bandsaw resawing fence) add to this guide's versatility in the shop.	The least deflection of the two-piece guides. Subbase travels up to 6½" perpendicular to the rail for multiple cuts without moving rail. A 48" workpiece pushes the limits of the 50"-long rails. Subbase can be used off rail with optional edge guide and circle trammel.	Subbase not available for this model; user must provide ¼"-thick subbase. Captured carriage must be installed and removed from one end of rail. Setscrews on the "splice" between joined rails can damage rail if over-tightened. 1 1/16" workpiece-thickness capacity is smallest in test.
STANDARD ACCESSORIES (2)		R	
OPTIONAL ACCESSORIES (2)	B,C,F,L,P,Q,R,S	C,E,T,X	U
AVAILABLE CAPACITIES (maximum workpiece that fits between clamps)	12", 24", 36", 50"	24", 36", 48", 96"	55", 110"
WARRANTY	Lifetime	Lifetime	Lifetime
COUNTRY OF ASSEMBLY (3)	T	U	C
PRICE OF 48"-CAPACITY GUIDE WITH ROUTER CARRIAGE/SUBBASE (4)	$80	$180	$85 (+ user-supplied subbase)
FOR MORE INFORMATION, CALL OR CLICK:	877/888-6759, eemersontool.com	732/259-9984, eurekazone.com	800/345-2396, hartvilletool.com

NOTES:

1. A Excellent
   B Good
   C Fair
   D Poor

2. (B) Bandsaw resawing fence
   (C) Circular-saw subbase
   (E) Edge guide for handheld use
   (F) Feather board
   (L) Laminate-trimmer subbase
   (P) Pocket-hole jig
   (Q) Squaring attachment
   (R) Router subbase
   (S) Stopblock
   (T) Circle-routing accessory
   (U) Carriage for user's subbase
   (X) Extra subbases

3. (C) China
   (T) Taiwan
   (U) United States

4. Prices current at time of article production and do not include shipping where applicable.
   (*) Sold as pair of 64" rails
   (**) Sold only in 112" length, no carriage/subbase
   (***) Sold with a pair of 48" rails.

	Penn State Industries	Tool Trolley	Tru-Grip		Woodcraft
	PPS2	Converter Router Trolley	Pro Series	Clamp 'N Tool Guide	Pro Gold Multi-Guide
	Noncaptured	Noncaptured	Noncaptured	Noncaptured	No subbase
	11⁄32"	13⁄32"	5⁄16"	1⁄4"	No subbase
	Wraparound with screw clamp	Clamps not provided	Edge grip with cam-lever clamp	Edge grip with cam-lever clamp	Wraparound with screw clamp
	2 1⁄4"		Unlimited	Unlimited	1 1⁄4"
	No	No	Yes	Yes	No
	Butt-joined short rails	Butt-joined short rails	Longer, separate guide	Cannot clamp longer than 50"	Butt-joined short rails
	A-	B	A	B-	B
	C	D	A	Not sold in 8' length	C
	Smooth	Setup for smooth travel takes longer than the other carriages.	Smooth	Smooth	No carriage
	A	B	A	A	
	Clamps marred bottom of workpiece, so we inserted scrapwood pads. They also can slide out of rail accidentally.	Clamps not provided, but 2"-wide rail provides plenty of clamping area.	Slide movable jaw against workpiece, then flip locking lever. No overhang required.	Slide movable jaw against workpiece, then flip locking lever. No overhang required.	Clamps cannot slide out; C-style clamp is tedious to tighten.
	C	B	A	A	C
	B	A	A	A	A
	No damage apparent	No damage apparent	No damage apparent	No damage apparent	No carriage/subbase
	A	A	A	A	
	The longest rails in the test. Carriage can be used with circ saw with router subbase removed. However, the steel carriage may obstruct the bit on routers with bases larger than 6" in diameter. Our carriage had a protruding screw that we filed down to prevent scratching the workpiece.	Excellent instruction manual and Web site show many ways to use this guide. 1⁄4×8×12" router subbase doubles as router-table insert, and can move up to 3 3⁄4" perpendicular to guide. The 48" rail on a 48" workpiece provided little infeed/outfeed support for the carriage.	Installs easily on a workpiece of any thickness, and on narrow pieces without clamp interference. Beefy UHMW subbase is rabbeted to maximize cutting depth. Built-in adjustments for wear. Workpieces over 48" require a separate 100" rail, which can be difficult to transport and store.	Similar to Tru-Grip Pro Series, but narrower rail deflected more, and 50" rail is the longest available. Price below includes 1⁄4" acrylic subbase (as shown in the photo *above*), but you can save about $12 if you buy only the carriage and add your own subbase.	Clamp design keeps them from sliding around willy-nilly while mounting the rail on the workpiece. Metal shims prevent splice from marring the rails when joining two rails. However, the unavailability of a carriage/subbase knocks it out of contention in our test.
	C	R			
	R,X	C	C,R,S	R	
	52", 116"	48", 96"	30", 54", 99"	24", 36", 50"	56", 112"
	2 years	6 months	Lifetime	Lifetime	1 year
	T	U	U	U	T
	$110*	$140***	$88	$58	$70**
	800/377-7297, pennstateind.com	800/524-1138, tooltrolley.com	800/662-2892, trugrip.com		800/225-1153, woodcraft.com

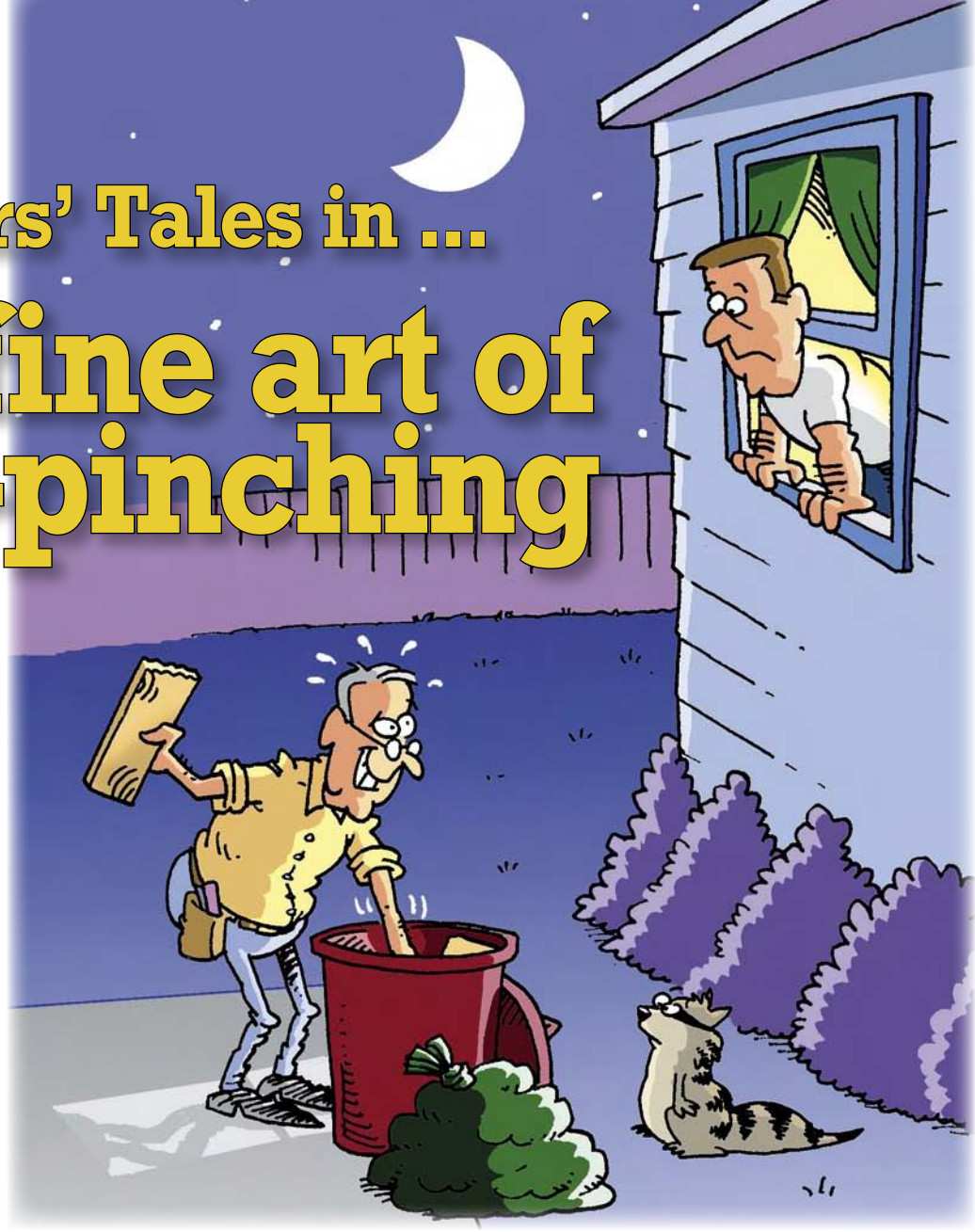
Our buying guidance for clamp-on tool guides

For this accessory's intended use—guiding a router or circ saw in a straight line—the Tru-Grip Pro Series fills the bill perfectly without busting the budget ($88, including carriage/subbase), so we named it the Top Tool. EZ Smart deserves honorable mention for its unique sliding-arm carriage and included accessories, making it one of the more versatile guides. However, it requires an up-front investment of $180.

Written by **Dave Campbell** with **Dean Fiene**

Woodworkers' Tales in ...

... the fine art of penny-pinching



We've all heard anecdotes concerning the odd things people do to save a little money. For instance, there was the lady who refused to throw away cellophane wrap. Instead, she hand-washed each sheet after use, and then stuck it to the side of her refrigerator to dry! Apparently, that tale is just the tip of a huge, miserly iceberg. That's what one Georgia woodworker—himself an admitted cheapskate—discovered when he posted the message *below* on the General Woodworking forum at woodmagazine.com.

His attention-grabbing post generated nearly 50 responses in just a few days! We've edited those down to, uh, well, the "stingiest." So have some fun reading them—we sure did! And who knows, you may pick up some tips for saving a few pennies that could be put toward that new tool you've been dreaming about. First, the post that started the avalanche of responses:

Yesterday, as I was washing/cleaning a paint stirring stick (came from the store for free, and I've had it and used it for years), I got to wondering just who is the stingiest one among us? And tell us what it is you do that actually saves you money with your woodworking, or maybe it's just a little quirk like my paint sticks that I just hate to throw away. Come on now, be a man and fess up. Ladies, you're invited also!

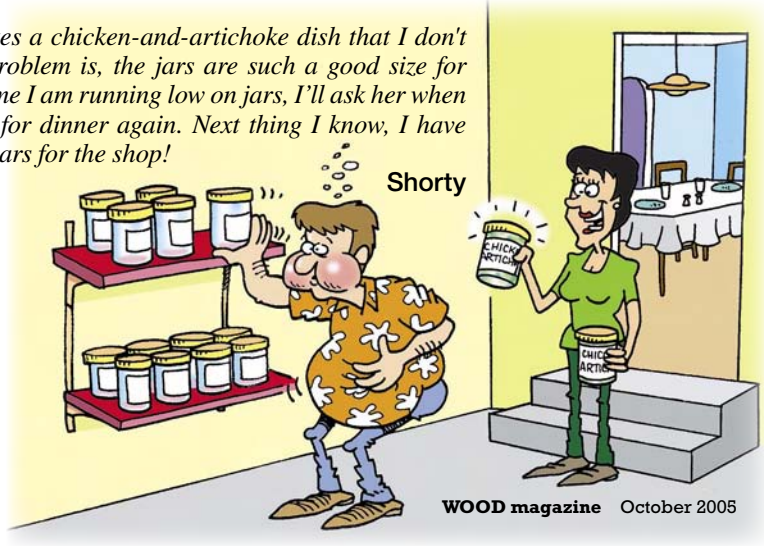
Buck Nall, Alma, Ga.

Okay, here goes. Someone has to be first. I can't bear to throw away pieces of wood that might have a use (I also check the neighbors trash cans for usable wood) until they get so small that nobody can do anything with them. Then I give them to a fellow woodworker who heats his shop with wood. Nothing is wasted.

Dan Shaw, Sunbury, Ohio

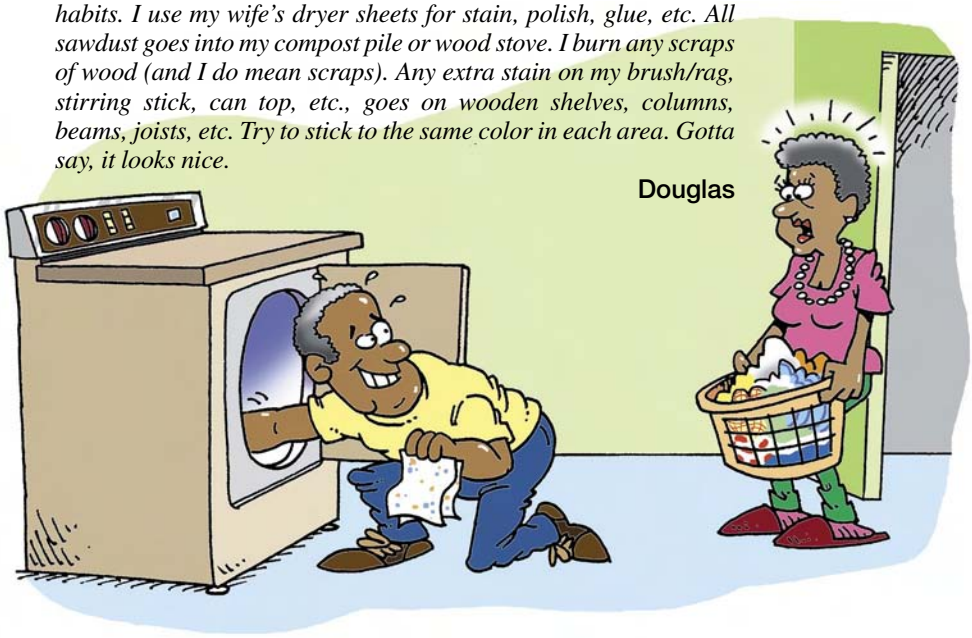
My girlfriend makes a chicken-and-artichoke dish that I don't like very much. Problem is, the jars are such a good size for shop use. Every time I am running low on jars, I'll ask her when we're having that for dinner again. Next thing I know, I have three or four new jars for the shop!

Shorty



You guys crack me up. I thought I was the stingiest of anybody, but I guess I've been outdone. I do, however, practice a few skinflinty habits. I use my wife's dryer sheets for stain, polish, glue, etc. All sawdust goes into my compost pile or wood stove. I burn any scraps of wood (and I do mean scraps). Any extra stain on my brush/rag, stirring stick, can top, etc., goes on wooden shelves, columns, beams, joists, etc. Try to stick to the same color in each area. Gotta say, it looks nice.

Douglas

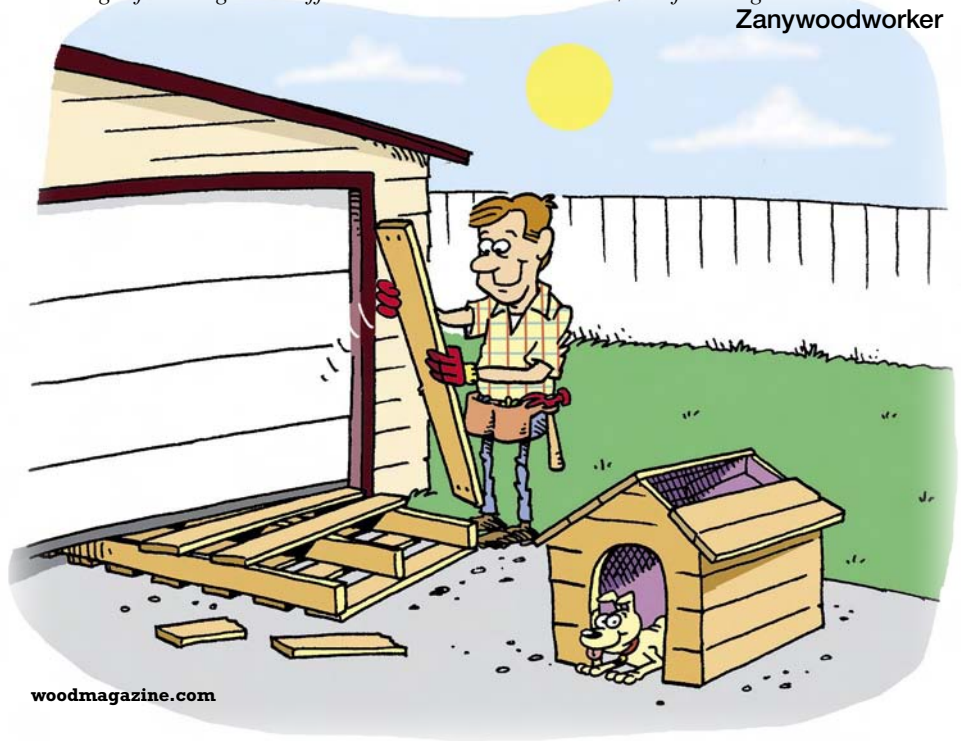


I save old nails, screws, wood scraps, pill bottles, 35mm film canisters, Spam cans, coffee cans, magazines, Xerox paper, old magnets, bits of metal, and hardware of all descriptions. You name it and I probably save it. Every five years, I decide to clean up and usually get rid of about 30 percent, but save the rest for the next "clean up." Every time I throw something away, the next day I find that I need it.

Ronald Seto, Vancleave, Miss.

I get free wooden pallets from work. They're pine (knotty) and 16' long, made of 2×4s and 1-bys. I take them apart and use the wood for various projects, and also take the nails out and re-use them. I haven't figured out what to use the staples for yet, so I don't save them. With all the found wood, I built my 20×20' shop, a 12×16' shed, and I am starting a finishing room off the barn. Total cost: about $500 for things I didn't have.

Zanywoodworker



OK, here's my confession. I never throw away any old, broken, worn-out thing without first removing all of the screws and putting them in a jar. I will spend an hour collecting fifty cents worth of screws, nuts, and washers. If it has switches and knobs, they get saved also. If that isn't cheap, I don't know what is. I went to Webster's dictionary to look up the definition and next to it was my picture!

Bill Boehme,
Dalworthington Gardens, Texas

I save bent nails. Once I straighten them with a hammer or in my vise, I toss them back in their appropriate box so I can use them again!

Kevin S., St. Charles, Mo.

Sandpaper scraps—have several coffee cans full of them—always figure they're good at the next higher grit.

Carl Love, Annapolis, Md.

Produced by **Pete Stephano**
Illustrations: **Buck Jones**

build-in-a-weekend bookcase

Solid wood and simple moldings make a fitting home for books and collectibles.

You'll love the traditional styling and no-nonsense construction of this project. To help speed the bookcase through your shop, we've sourced mail-order feet. But, should you want to turn your own feet, we've included a full-size pattern on the *WOOD Patterns*® insert. And, you can give the bookshelf a touch of your own personal style by simply choosing a different foot and routing a different profile on the face-frame stiles. (See *page 82* for a few options.)

AT A GLANCE

Overall dimensions:
- 35½" wide × 12¾" deep × 50" high
- For the board feet of lumber and other items needed to build this project, see *page 80*.

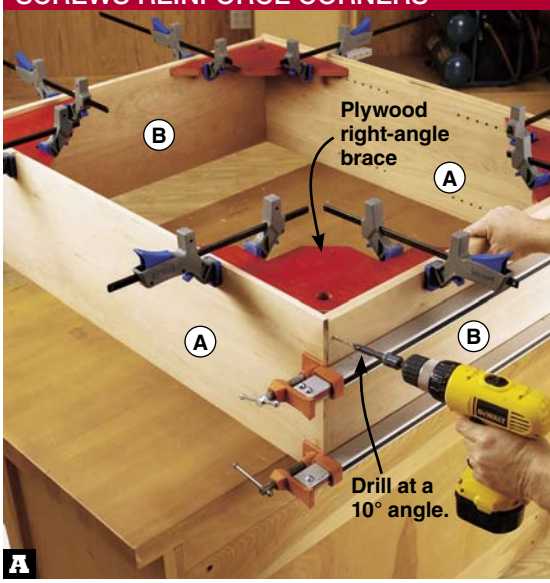
Start with the case

1 From ¾"-thick stock, edge-join oversize blanks for the sides (A), top and bottom (B), cap (C), and shelves (D). Sand the blanks smooth and cut them to the sizes listed on the **Materials List**. To assist you in accurately crosscutting the parts, see the tablesaw jig on *page 96*.

2 With a dado blade in your tablesaw, cut ¾" rabbets ⅜" deep in the ends of the sides (A), where shown on **Drawing 1**. Then cut a ¼" rabbet ⅜" deep along each inside back edge. Now lay out the shelf-support hole centers where dimensioned, and using a ¼" brad-point bit with a depth stop, drill ⅜"-deep holes. Finish-sand the sides and the top and bottom (B).

3 Glue and clamp together the sides (A) and top and bottom (B), in the configuration shown on **Drawing 2**. Use shop-made plywood right-angle braces to keep the assembly square. (To obtain a free downloadable plan for the plywood right-angle braces, go to woodmagazine.com/brace.) Then reinforce the joints with screws, where shown on **Drawings 2** and **2a** and as shown in **Photo A**.

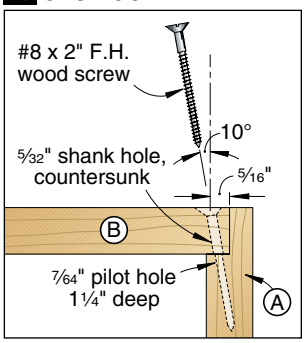
SCREWS REINFORCE CORNERS



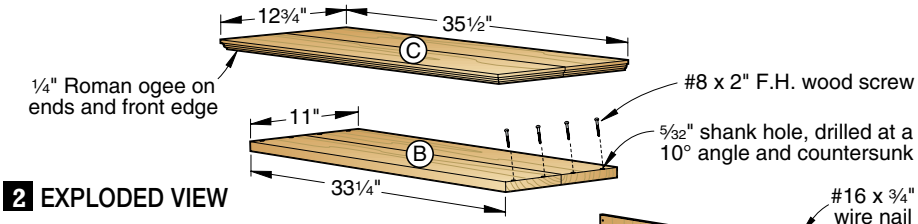
A

Drill angled screw holes 5/16" from the ends of the top and bottom (B) into the sides (A). Then drive the screws.

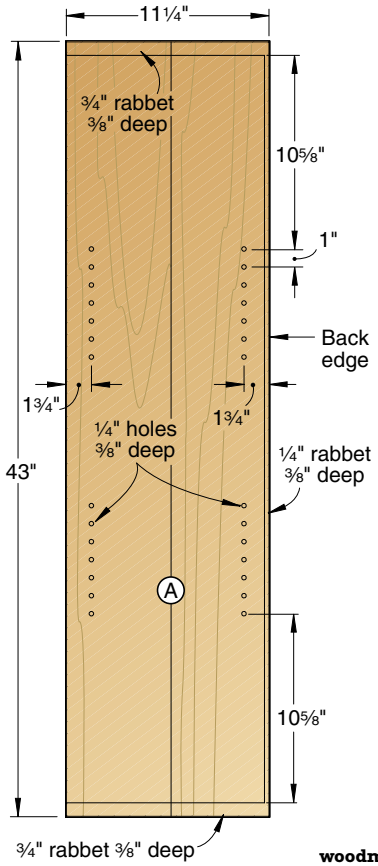
2a CASE CORNER DETAIL

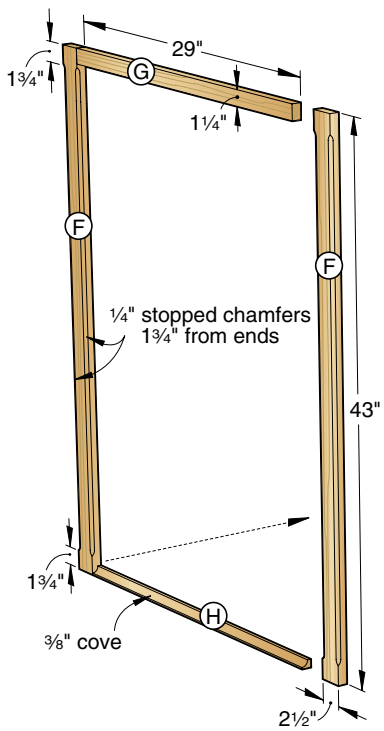


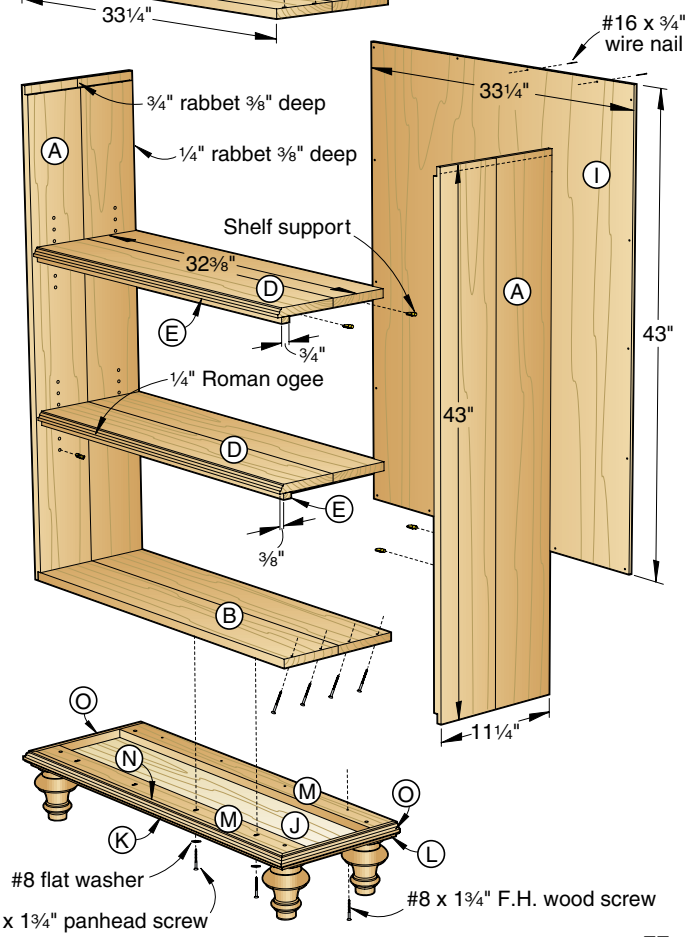
2 EXPOLODED VIEW



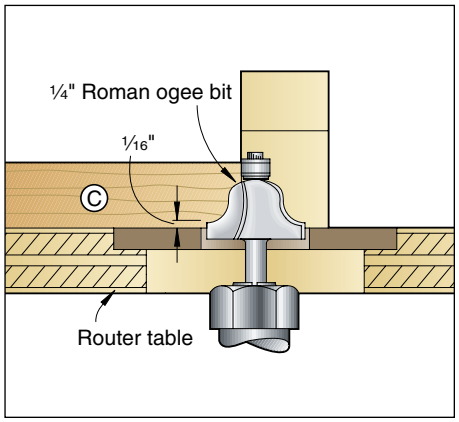
1 SIDE (Inside face shown)



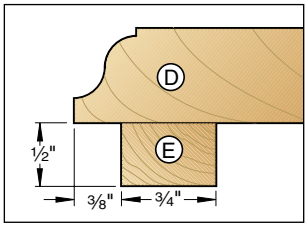




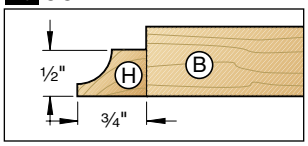
2b ROMAN OGEE DETAIL



2c SHELF DETAIL



2d COVE DETAIL



4 Retrieve the cap (C). Chuck a ¼" Roman ogee bit into your table-mounted router. Then rout the profile shown on **Drawing 2b** along the ends and front edge. Finish-sand the cap and glue and clamp it to the top (B), flush with the back edges of the sides (A) and centered side-to-side.

5 Retrieve the shelves (D) and rout a ¼" Roman ogee profile along the top front edges, where shown on **Drawing 2**. Then cut the shelf rails (E) to size. Keeping the ends flush, glue and clamp the rails to the shelves, where shown on **Drawing 2c**. Now finish-sand the shelves.

6 Cut the stiles (F) to size. To rout the stopped chamfers, where shown on **Drawing 2**, see the sidebar, *below*.

7 Glue and clamp the stiles (F) to the sides (A), keeping the outside edges flush. Check the distance between the stiles, and cut the rail (G) to size. Then glue and clamp the rail to the top (B). Finish-sand the stiles and rail.

8 For the cove (H), cut a ¾×2½×36" blank and plane it to ½" thick. Chuck a ⅜" cove bit into your table-mounted router and rout one edge of the blank. Do not change the router-table setup. Then, using your tablesaw, rip the ½"-thick cove from the edge of the blank. Set aside the rest of the blank for parts K and L. Check the distance between the stiles (F), and cut the cove to length. Finish-sand the cove and glue and clamp it to the front edge of the bottom (B) with the bottom edges flush, where shown on **Drawing 2d**.

9 Cut the back (I) to size, finish-sand it, and set it aside.

Now make the base

1 From ½" birch plywood, cut the base panel (J) to size.

2 Retrieve the ½"-thick blank left from making part H and rip two ½"-wide strips from it. Miter-cut one strip to length for the front cove (K) and glue and clamp it to the front of the base panel (J), where shown on **Drawing 3**. Cut the other strip in half for the side coves (L) and miter one end of each piece. Dry-fit the side coves and mark the lengths flush with the back edge of the base panel. Cut the coves to length and glue and clamp them in place. Sand the coves flush with the panel. Returning to the previous router-table setup, rout coves along the bottom ends and front edge of the panel/cove assembly (J/K/L).

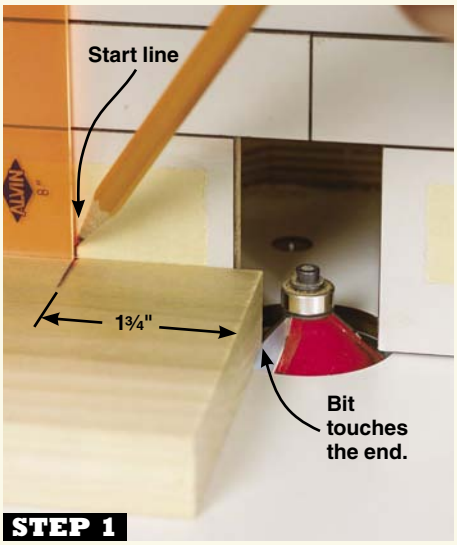
3 Cut the fillers (M) to size. Glue and clamp them to the base panel assembly

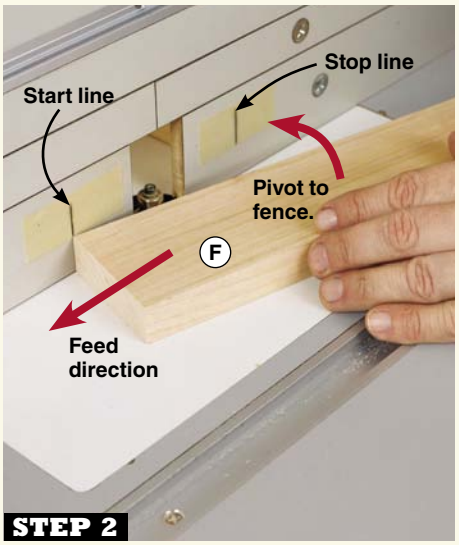
Forming stopped chamfers on your router table

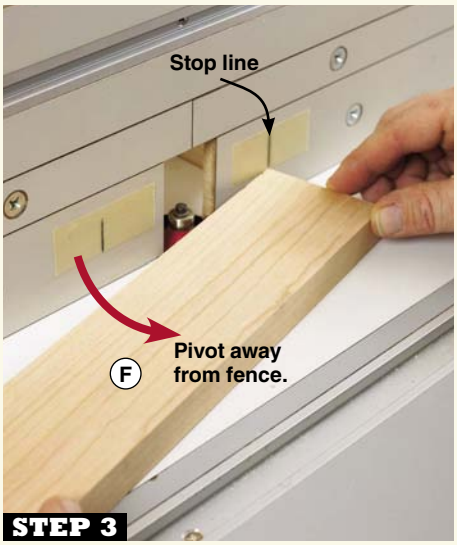
Using stopblocks clamped to a router-table fence to rout the stopped chamfers on the stiles (F) would require an auxiliary fence almost 8' long. Here's a way that uses your regular fence and no stopblocks at all.

With your table-mounted router unplugged, chuck in a chamfer bit and adjust it to rout a ¼" chamfer. Then make a mark at the edge of a piece of scrap 1¾" from the end. Turning the bit by hand, position the scrap so the bit touches the end. Mark a start line on the fence to the left of the bit, as shown in **Step 1**. Then repeat the process to mark a stop line to the right. Plug in the router.

With the router running, hold the stile (F) with one corner on the start line and angled away from the fence, as shown in **Step 2**. Pivot the stile against the fence and feed it to the left. Continue routing the stile until the trailing end aligns with the stop line. Holding the corner against the line, pivot the stile away from the fence, as shown in **Step 3**. Repeat on the other edge and other stile.



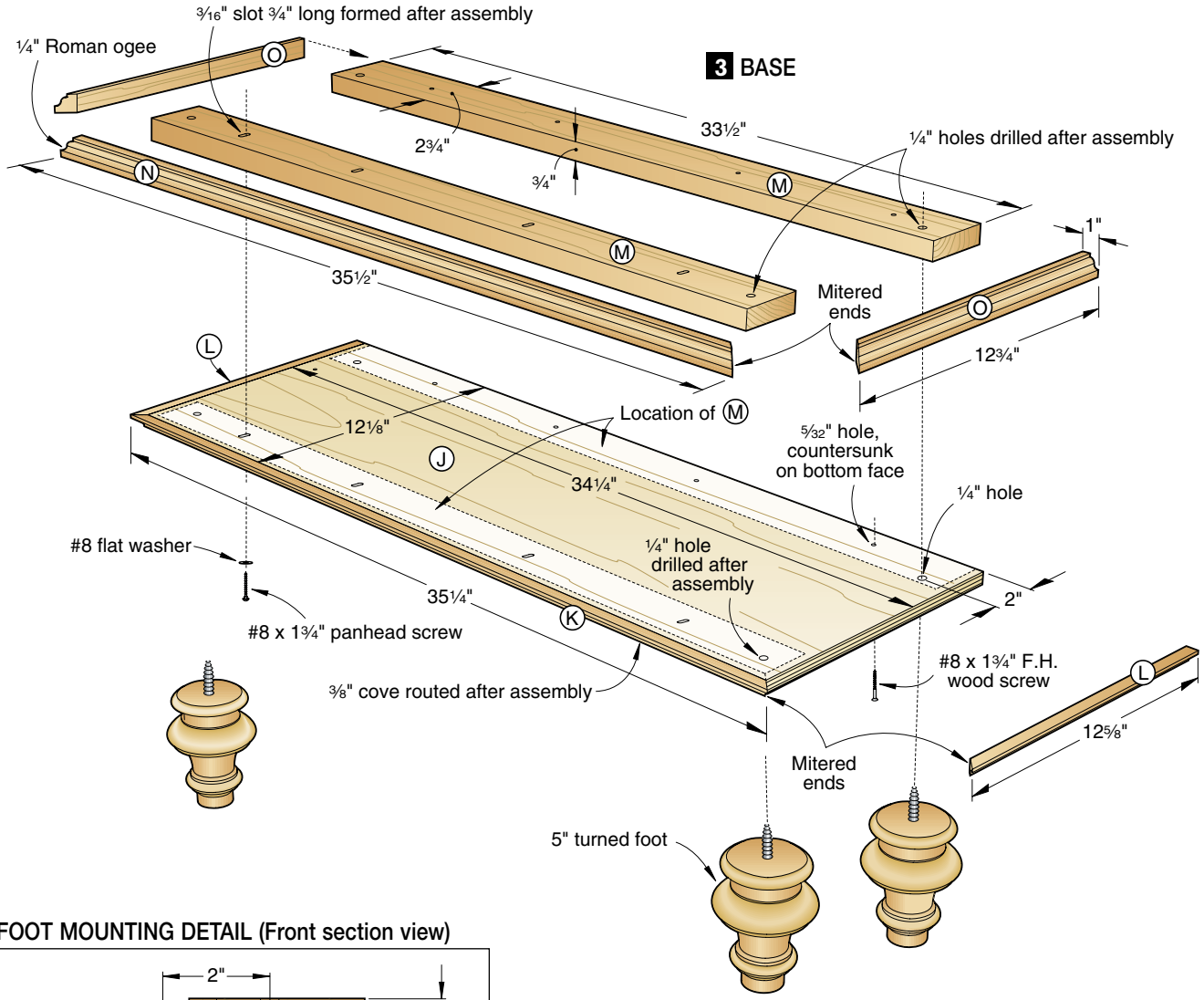


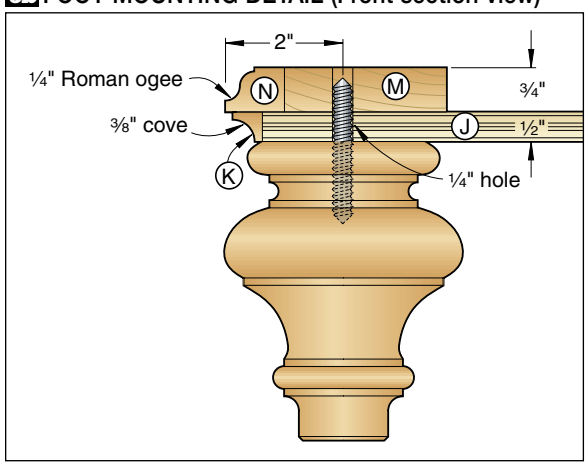


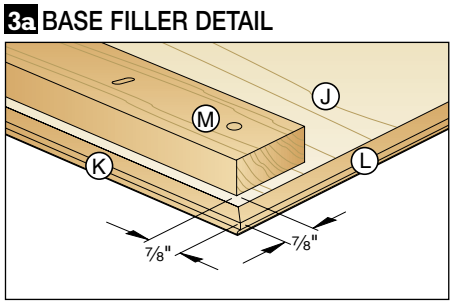
(J/K/L), centered side-to-side with the front spacer ⅞" back from the front edge, where shown on **Drawing 3a**, and the rear spacer flush at the back.

4 Cut a ¾×2½×37" blank for the front ogee (N) and side ogees (O). Chuck a ¼" Roman ogee bit into your table-mounted router and adjust it to cut the profile shown on **Drawing 2b**. Rout both edges of the blank, and then rip one 1"-wide ogee molding from each edge. Next miter-cut one piece to length for the front ogee and glue and clamp it in place. Now cut the other piece in half for the side ogees, and miter one end of each piece, making sure you have mirror-image parts. Dry-fit and trim them to length in the same manner as for the side coves (L). Glue and clamp the side ogees in place.

5 Drill ¼" holes through the fillers (M) and base panel (J) for mounting the feet, where shown on **Drawings 3** and **3b**. (See **Source** on *page 80* for the turned feet.) Then, for later mounting the base to the case, drill screw holes, countersunk on the bottom, through the rear filler and base panel, and form 3/16" slots ¾" long in the front filler and base panel, where shown.







With the drill press running at 450 rpm, sand the feet with a progression of 120-, 150-, and 220-grit sandpaper.

Turning the drill-press chuck by hand, apply stain with a brush. Then remove most of the excess stain with a paper towel.

With the drill press running, use a paper towel to finish wiping the stain. Remove the feet from the chuck and set them aside to dry.

On to the finish

1 To stain the turned feet (we used Zar Modern Walnut), first wrap the protruding dowel screw with a couple of layers of masking tape. Then one at a time, chuck them into your drill press and follow the steps shown in **Photos B**, **C**, and **D**.

2 Check all the parts and finish-sand any areas that need it. Apply stain and let the parts dry for 24 hours. Then apply a clear finish. (We sprayed on three coats of water-based satin polyurethane, sanding between coats with 220-grit sandpaper.)

3 Nail the back to the case with #16×¾" wire nails. Then lay the case, back down, on your workbench and clamp the base to it, flush at the back and centered side-to-side. Now using the screw holes and the centers of the slots in the base as guides, drill pilot holes into the bottom (B). Fasten the base to the case with #8×1¾" flathead wood screws at the back and #8×1¾" panhead screws and #8 flat washers at the front, where shown on **Drawing 2**.

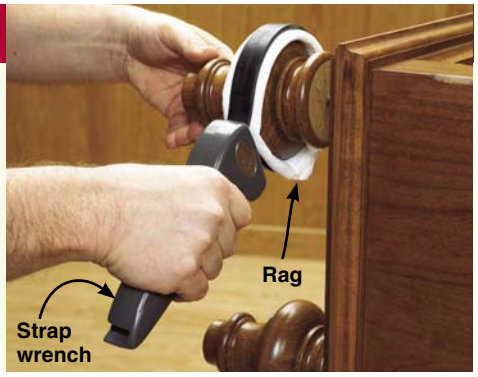
4 Turning the feet by hand, screw them into the base. For help installing the feet, see the **Shop Tip** *below left*. Place your bookshelf against the wall, and move your library into an elegant new home.

Written by **Jan Svec**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine**

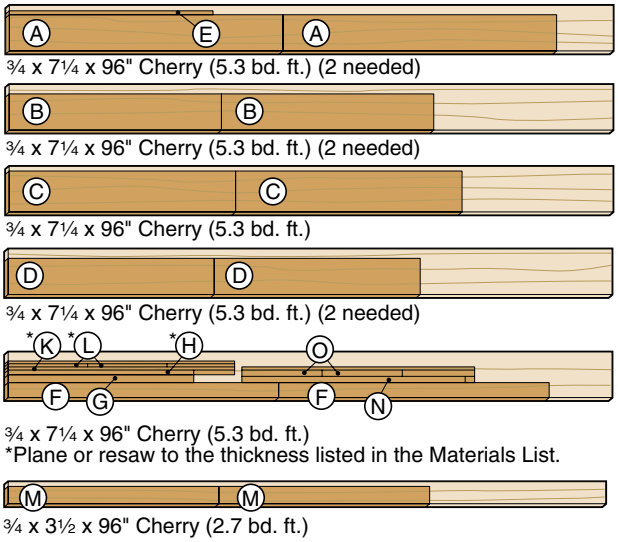
SHOP TIP

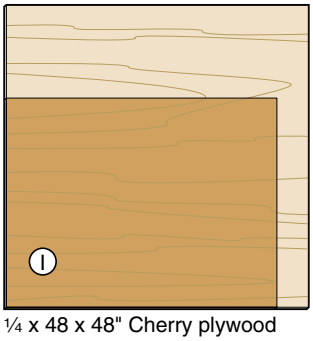
No-mar installation solution

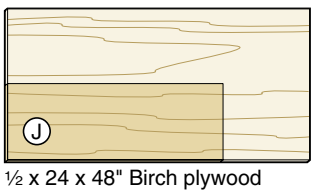
When screwing the feet into the base, getting a good grip and adequate leverage on them can be difficult. To solve both problems without marring the finish, wrap the feet with a rag and turn them with a strap wrench, as shown at *right*. We purchased a plastic-handled two-wrench set at a home center for $10.



Cutting Diagram







Materials List

Case		FINISHED SIZE T	W	L	Matl.	Qty.
A*	sides	¾"	11¼"	43"	EC	2
B*	top and bottom	¾"	11"	33¼"	EC	2
C*	cap	¾"	12¾"	35½"	EC	1
D*	shelves	¾"	10⅞"	32⅜"	EC	2
E	shelf rails	¾"	½"	32⅜"	C	2
F	stiles	¾"	2½"	43"	C	2
G	rail	¾"	1¼"	29"	C	1
H*	cove	½"	¾"	29"	C	1
I	back	¼"	33¼"	43"	CP	1
Base						
J	base panel	½"	12⅛"	34¼"	BP	1
K*	front cove	½"	½"	35¼"	C	1
L*	side coves	½"	½"	12⅝"	C	2
M	fillers	¾"	2¾"	33½"	C	2
N*	front ogee	¾"	1"	35½"	C	1
O*	side ogees	¾"	1"	12¾"	C	2

*Parts initially cut oversize. See the instructions.
Materials key: EC–edge-joined cherry, C–cherry, CP–cherry plywood, BP–birch plywood.
Supplies: #8x1¾", #8x2" flathead wood screws; #8x1¾" panhead screws; #8 flat washers; #16x¾" wire nails; ¼" shelf supports.
Blade and bits: Stack dado set; ¼" brad-point drill bit; chamfer, ⅜" cove, ¼" Roman ogee router bits.

Sources

Feet. 5" cherry feet with dowel screws, no. AO556-DS-5 (4). Adams Wood Products. For a current price and to order, call 423/587-2942.

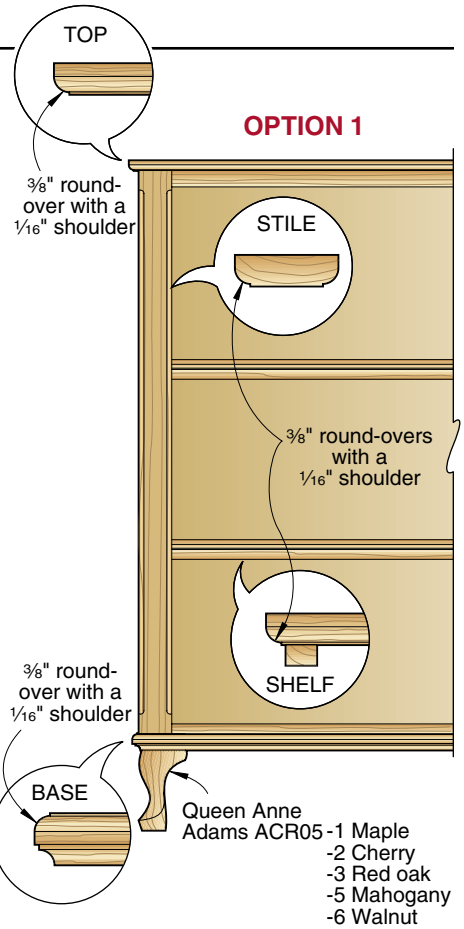
4 easy bookcase options

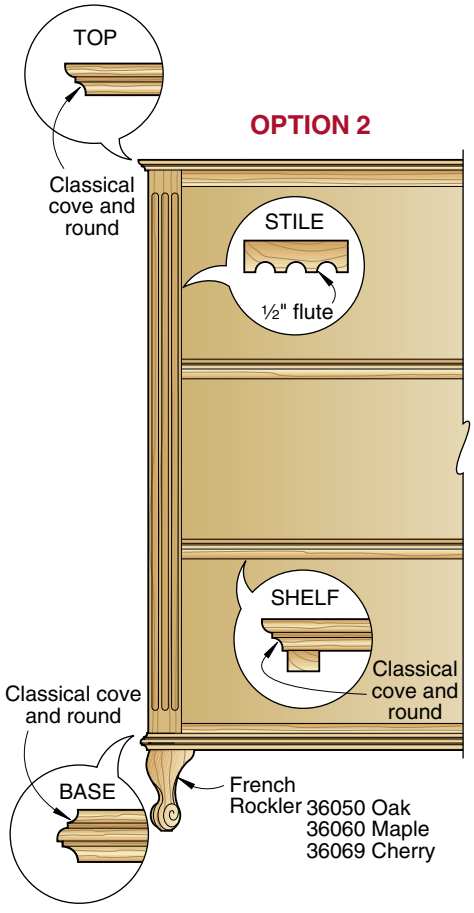
A few simple changes will give your project a whole new look.

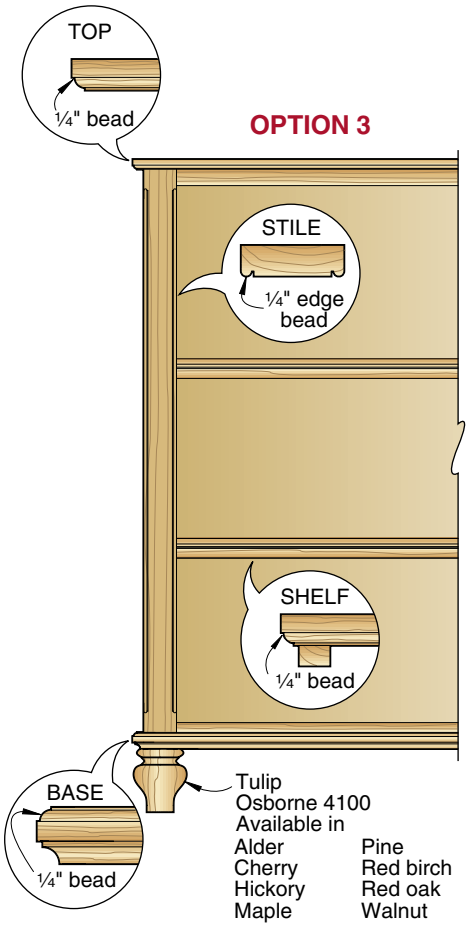
It's amazing how you can completely alter the appearance of a project without changing dimensions or construction methods. We drew up different combinations of stile treatments, routed edges, and foot profiles for the bookcase on *page 76*, and came up with the new looks shown here. Changing some of these features amounts to little more than choosing a different router bit. And with ready-made legs, like the ones shown, you have lots of options. The ideas pictured here show only a few possibilities. For more foot profiles, as well as a wide range of other manufactured wood parts, see *below*.

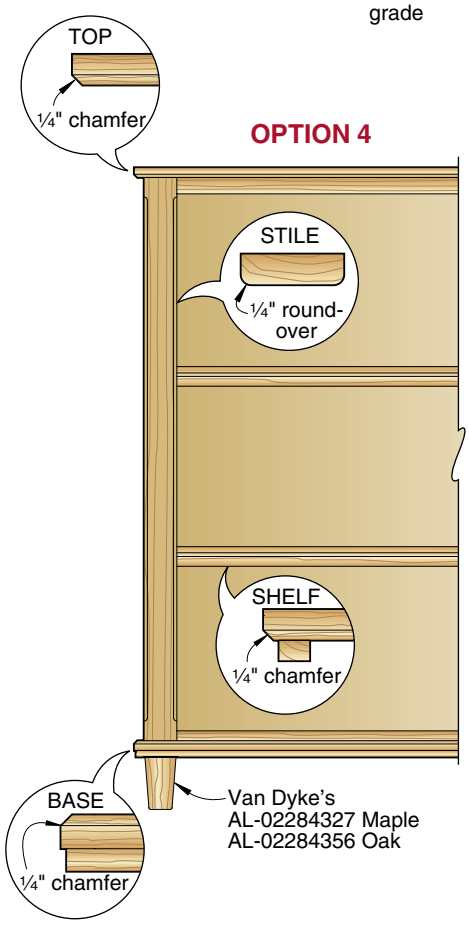
Sources for more foot styles

•Adams Wood Products: Call 423/587-2942, or go to adamswoodproducts.com.
•Osborne Wood Products: Call 800/849-8876, or go to osbornewood.com.
•Rockler: Call 800/279-4441, or go to rockler.com.
•Van Dyke's Restorers: Call 800/558-1234, or go to vandykes.com.









woodworker's guide to woodshop

There's a good reason the vast majority of us don't do our woodworking at the dining-room table: Working with wood can tear up surfaces! Workbench tops, assembly tables, and outfeed surfaces need to withstand mallet blows, glue drips, solvent spills, and countless other abuses. Worksurfaces should also be solid and as flat as possible. So it makes sense to choose worksurface materials that are affordable, yet able to withstand the punishment you're likely to dish out.

For these reasons, we've created this handy worksurface selection chart. In addition to how well a surface takes abuse, consider these personal preferences when using the chart:

- How important are aesthetics? A maple butcher-block surface

WORKSURFACE SELECTOR

Material	Hardboard: Tempered & Standard	Softwood Plywood	Particleboard	Medium-Density Fiberboard (MDF)
What it is	Ground wood pulp combined with resins pressed into sheets; may be smooth on one or both sides; tempered is harder and denser than standard	Face-glued layers of thin softwood veneers Veneer Grades: **A**- plugged, smooth sandable surface **B**- plugs and 1" tight knots allowed **C**-1½" tight knots and sanding defects allowed **D**- 2½" knots and splits allowed	Wood shredded into tiny chips and combined with adhesives, then heated and compressed to form sheets	Cellulose fibers combined with synthetic resin and formed under heat and pressure
Available sizes	⅛" and ¼" thicknesses in 4×8' sheets	¼", 5/16", 11/32", ½", 5/8", 23/32", and ¾" thicknesses in 4×8' sheets; interior and exterior available	¼", ½", ⅝", ¾", 1", and 1⅛" thicknesses available in 4×8' sheets; Grades: PBU for floor underlayment; M-S, M-1, M-2, and M-3 industrial grades	MDF available in ¼", ⅜", ½", ⅝", ¾", and 7/8" thicknesses in both 4×8' and 49×97" sheets; lightweight MDF, same sizes and 20% lighter
Find it here	Home centers carry 4×8' sheets, plus half and quarter sheets in standard and tempered grades	Home centers and building-supply stores	Home centers carry ¼"-¾" PBU grade; M grades found at building-material and millwork suppliers	Building material suppliers carry standard and lightweight MDF in ¾" sheets. Home centers carry standard MDF
Pros	Readily available; easy to cut; relatively stable; takes paint well	Readily available; easy to cut; face veneers can have a nice appearance; stainable and paintable	PBU grade readily available and inexpensive; particleboard cuts easily and is fairly stable.	Flat; no face or core voids; consistent thickness; glues well; cuts and machines easily; stable; paints well.
Cons	Standard grade susceptible to moisture; can't sand faces; flexible; needs substrate support; edges damage easily; holds fasteners poorly	Surface scratches easily; interior plies may have voids; face veneers often patched	Heavy; holds fasteners poorly; not moisture-resistant	Heavy (100 lbs. per ¾" sheet for standard MDF); holds screws poorly; scratches and gouges are difficult to repair
Cost	$10 (¼"×4'×8', tempered) $8 (¼"×4'×8', standard)	$25+ (¾"×4'×8', A grade on one face, C grade on other)	$12+ per sheet for PBU grade; M grade prices range about 20% higher	$20+ per ¾" sheet; lightweight MDF prices range about 25% higher
Best for	Tempered-grade sheets are excellent for replacable benchtops.	Good for shop cabinets and countertops	Good as substrate (underneath a harder material, such as plastic laminate) for countertops	Excellent for shop cabinets and as a substrate for plastic laminates and hardboards

worksurfaces

looks better than an easily replaced sheet of tempered hardboard backed by a sheet or two of particleboard. Of course, such good looks come at a considerably higher price.

■ Do you cover work surfaces when assembling, finishing, or painting objects placed on them? If not, get a surface that can be easily cleaned or replaced.

■ Do you prefer a heavy surface? Many woodworkers like a dense, stout material that lends many stabilizing pounds to a bench that will remain in one place.

■ Do you need the flattest possible surface? If you assemble a lot of projects on your bench, this should rank high on your list of work-surface requirements.

	Plastic Laminate Over Particleboard	Solid-Core Door	Laminated Maple	2x Construction Lumber
	Particleboard faced with plastic laminate (several layers of paper impregnated with resins, bonded together and cured under heat and pressure)	Core materials include particle-board, medium-density fiberboard (MDF), fireproof mineral core, or wood staves surrounded by solid wood and veneered with hardwood veneers	1¾"-thick laminated maple strips, sanded smooth and flat	1½"-thick softwoods—spruce, fir, or pine
	Laminate countertops available in 25", 36", and 48" widths and lengths from 2' to 12'	Typical sizes: 30", 32", and 36" widths, 84" length and 1⅜" thickness	24", 30", and 36" widths; 48", 60", 84", and 96" lengths	2×4, 2×6, 2×8, 2×10, and 2×12; lengths from 8'
	Home centers and building material suppliers	Home centers and building material suppliers	Home centers and mail-order catalogs	Home centers and building-material suppliers
	Cleans easily; inexpensive; readily available; many colors and patterns available	Readily available; nice appearance; stainable or paintable; flat surface	Nice appearance; stable; flat; scratches can be repaired; adds mass to bench	Readily available; inexpensive; easily repaired; cuts and fastens well
	Scratches easily; hard to repair; needs fine-tooth blades when cutting to prevent chipping	Holds screws poorly; scratches easily; can be expensive	Expensive; heavy; scratches easily	Dents and scratches easily; not attractive; has tendency to twist and warp
	$10+ per lineal foot, depending on pattern and width	$100+, seconds or damaged doors are considerably cheaper	$200+ for a 24×60" slab, plus shipping if necessary	$2-$8 per lineal foot for a 24"-wide surface; check local prices
	Good for outfeed tables	Good for workbenches and assembly tables	Excellent surface for workbenches and assembly tables	Good for inexpensive worktables

Produced by: **Pat Lowry**

young artist's easel

two sides double the fun

AT A GLANCE

- This project suits kids age 3–7 years.
- For the board feet of lumber and other items needed to build the easel, see *page 89*.

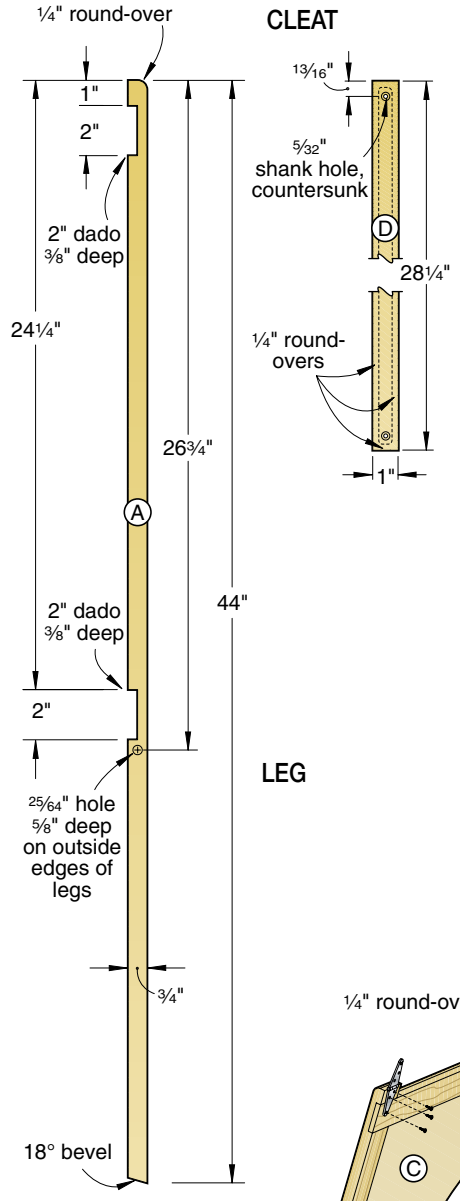
What is your young artist's favorite medium: crayons, paint, or chalk? With a chalkboard on one side and cleats to secure paper on the other, this fun-filled project helps bring out the creativity in any child. And don't worry about storing large sheets of paper. A 24"-wide, 150'-long roll provides a quick-change steady supply. (See **Source**.)

Build two leg assemblies

1 Cut the legs (A) and rails (B) to the sizes listed on the **Materials List**. Then install a dado blade in your tablesaw and form half-lap joints by cutting 2" dadoes ⅜" deep in the legs, where dimensioned on **Drawing 1**, and 2" rabbets ⅜" deep in the ends of the rails, where shown on **Drawing 2**. Now cut the 18° bevels at the bottom ends of the legs, orienting them as shown on **Drawing 1**.

2 Chuck a ¼" round-over bit into your table-mounted router and rout the top front end of each leg (A), where shown on **Drawing 1**. Then rout round-overs along the top front edges of the upper rails (B) and the bottom front edges of the lower rails (B), where shown on **Drawing 2**.

1 LEG ASSEMBLY PARTS



3 Arrange the legs (A) in pairs with the dadoes facing each other, and then place the pairs side by side. Now, on the outside edge of each leg, mark the centers of the holes just below the lower dadoes, where dimensioned on **Drawing 1**. Use your drill press to drill 25⁄64" holes ⅝" deep.

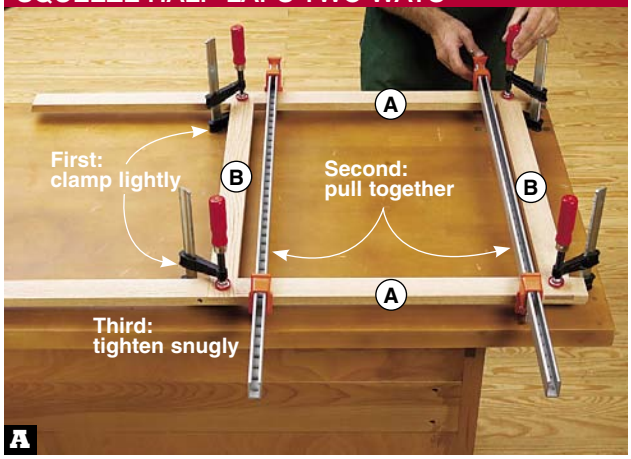
4 Apply glue and assemble the leg (A) and rail (B) frames, as shown in **Photo A**. With the glue dry, sand the joints smooth.

5 Chuck a ⅜" rabbet bit into your handheld router. Adjust the bit to match the thickness of the melamine-faced fiberboard used for the panels (C), and rout a rabbet along the *front* inside edges of each frame (A/B), where shown on **Drawing 2**. Finish-sand the frames.

6 Check the dimensions of the rabbeted openings, and cut the panels (C) to size. Bandsaw and sand the panel corners to match the rounded corners of the rabbeted openings. For another way to form the rounded panel corners, see the **Shop Tip** on *page 88*.

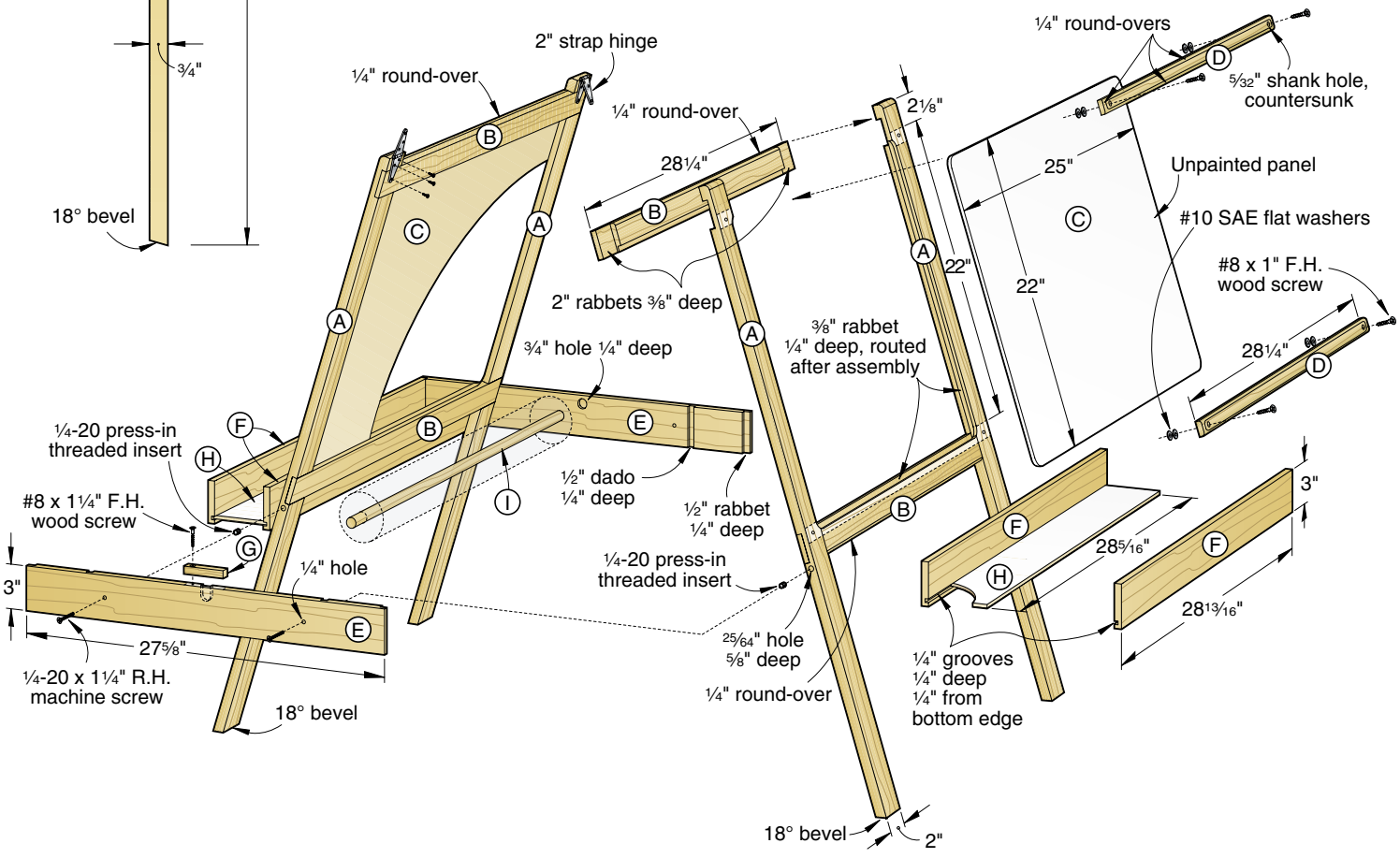
7 Paint one panel (C) with chalkboard paint and let it dry. (We used Rust-Oleum Specialty Chalk Board paint.) Then glue and clamp the panels into the rabbeted openings in the leg frames.

SQUEEZE HALF-LAPS TWO WAYS



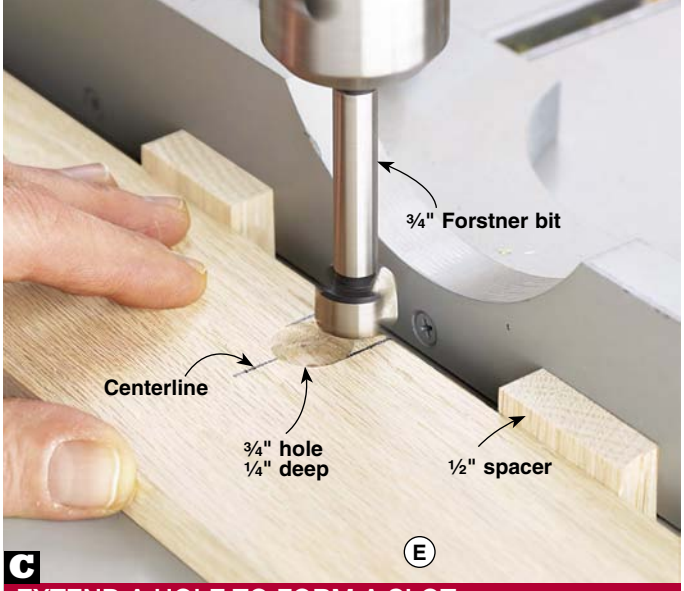
Lightly clamping the half-laps, draw the legs (A) together with bar clamps. Then tighten the clamps on the half-laps.

2 EXPLODED VIEW



B SURE-FIRE HINGE ALIGNMENT

Align the leg assemblies and clamp them together. Center the hinge knuckles on the joint line, drill pilot holes, and drive the screws.



C EXTEND A HOLE TO FORM A SLOT

Place ½" spacers betweeen the end (E) and the fence, and drill an overlapping hole on the centerline. Clean up the sides with a chisel.

Note: *Your retailer may stock ¼" fiberboard faced with melamine on one or both sides. Glue fiberboard faced with melamine on one side with regular woodworking glue. Adhere fiberboard faced with melamine on both sides with construction adhesive.*

8 Lay the leg assemblies facedown on your workbench with the top ends abutting. Now screw the hinges in place, as shown in **Photo B**.

9 From ½" stock, cut the cleats (D) to size. Drill centered countersunk screw holes, where dimensioned on **Drawing 1**. Then rout ¼" round-overs along the front ends and edges. Finish-sand the cleats.

Now add a pair of trays

1 From ½" stock, cut the easel ends (E) and fronts and backs (F) to size. Then cut dadoes and rabbets ¼" deep and drill ¼" and ¾" holes ¼" deep in the ends, where dimensioned on **Drawing 3**. Now on one of the ends, form a slot from the ¾" hole to the top edge of the part, as shown in **Photo C**.

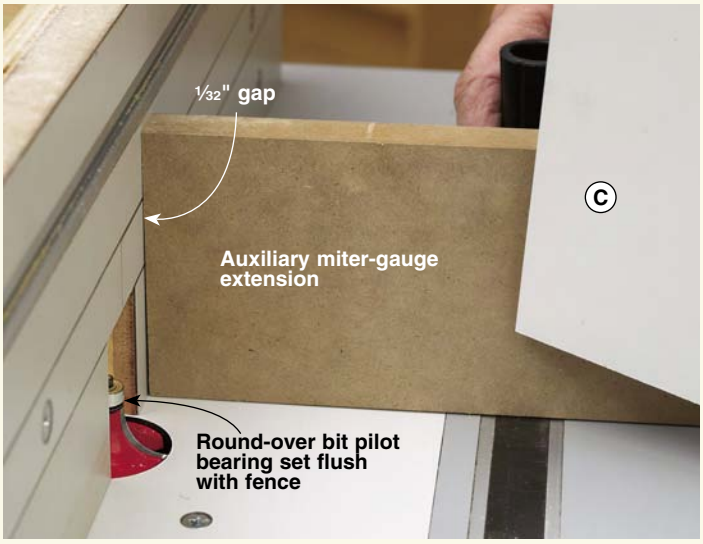
2 Cut the turnbutton (G) to size, and drill a countersunk shank hole, where shown on **Drawing 3**. Position the turnbutton over the slot in the end (E), and using the shank hole as a guide, drill a pilot hole into the top edge of the end. Finish-sand the turnbutton.

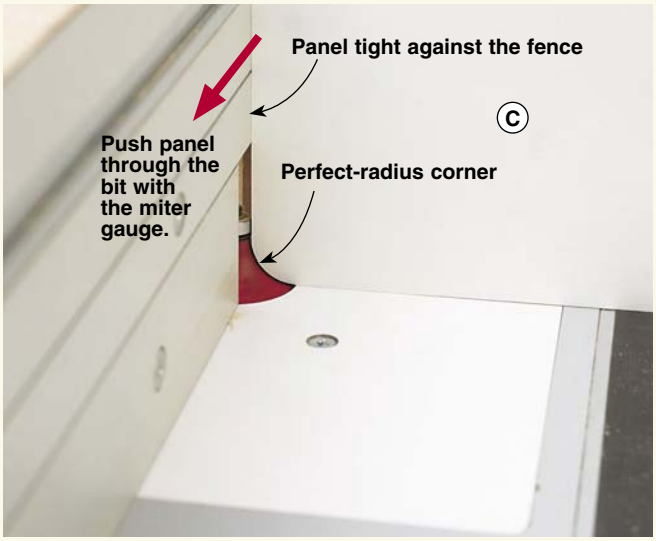
3 Cut the bottoms (H) to size. Then cut grooves for the bottoms in the fronts and backs (F), where shown on **Drawing 2**. Now finish-sand the ends (E) and fronts and backs, and glue and clamp the tray assembly together. Make sure it dries square and flat.

SHOP TIP

Routing perfect-radius panel corners

When routing a rabbet for a back or panel in an assembled case or frame, the rabbet bit leaves rounded corners. Instead of chiseling the corners square, you can saw and sand the back or panel corners round. When the corners show, as on the panels (C) in this project, sanding doesn't always give satisfactory results. For perfect corners, measure the radius of the rabbet bit and chuck a matching-radius round-over bit into your table-mounted router. Set up the router table, as shown *below left*. The tall miter-gauge extension steadies the panel and prevents chip-out. Then rout the panel corners as shown *below*.





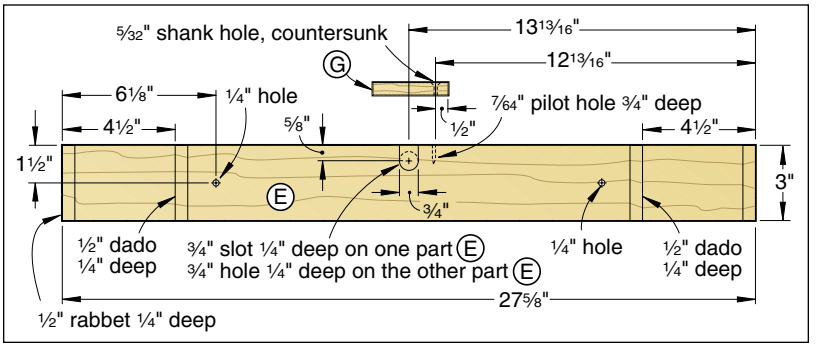
D

INSTALLING THE TRAYS

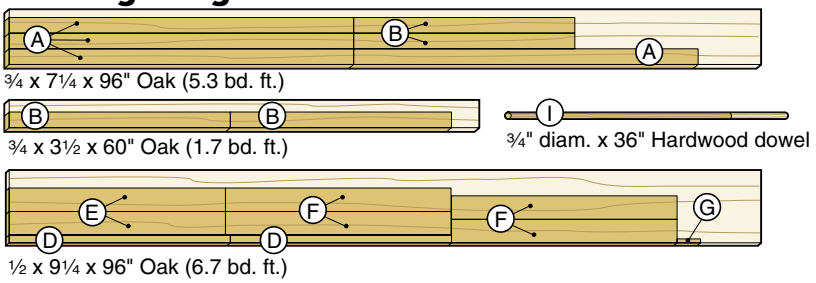
Insert the leg assembly between the trays, align the threaded inserts with the end (E) holes, and drive the machine screws.

From ¾"-diameter hardwood dowel, cut the rod (I) to length.

3 TRAY ENDS (INSIDE FACE SHOWN)



Cutting Diagram



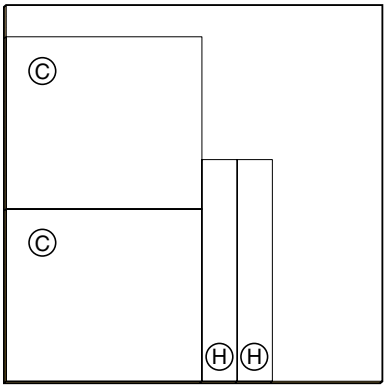
Apply finish and assemble

1 Remove the hinges, examine all parts and assemblies, and finish-sand where needed. Mask the panels (C) and tray bottoms (H), and apply a clear finish. (We sprayed on three coats of water-based satin polyurethane, sanding between coats with 220-grit sandpaper.)

2 Using a clamp, press threaded inserts into the 25/64" holes in the outside edges of the legs (A), where shown on **Drawing 2**.

3 Clamp the cleats (D) into place on the leg assembly with the unpainted panel (C), where shown on **Drawing 2**. Using the shank holes as guides, drill pilot holes into the legs (A). Remove the clamps, insert flat washers between the cleats and legs, and screw the cleats into place.

4 Rejoin the leg assemblies with the strap hinges and attach the tray assembly, as shown in **Photo D**. Then slide the rod (I) into the paper roll core, insert one end of the rod into the ¾" hole in one end (E), and drop the other end of the rod into the slot in the other end. Secure the rod with the turnbutton. Feed the paper up through the gap between the top rails (B) and then down under the upper and lower cleats (D). With a drawing complete, separate it from the roll, as shown in **Photos E** and **F**. Now fill the trays with a supply of paint, crayons, and chalk, and watch your budding artist bloom.



¼ x 48 x 48" Melamine-faced fiberboard

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

CHANGING THE PAPER

E

Pull the paper down until the top of the drawing is below the top cleat (D). Then cut the drawing from the roll with scissors.

STARTING A FRESH SHEET

F

The drawing is ready to hang. To get another sheet ready, simply pull down the cut end of the roll and slip it under the bottom cleat.

Materials List

		FINISHED SIZE T	W	L	Matl.	Qty.
Leg assemblies						
A	legs	¾"	2"	44"	O	4
B	rails	¾"	2"	28¼"	O	4
C	panels	¼"	22"	25"	MF	2
D	cleats	½"	1"	28¼"	O	2
Tray assembly						
E	ends	½"	3"	27⅝"	O	2
F	fronts and backs	½"	3"	28 13/16"	O	4
G	turnbutton	½"	½"	3"	O	1
H	bottoms	¼"	4½"	28 5/16"	MF	2
I	rod	¾" diam.	-	28¾"	HD	1

Materials key: O–oak, MF–melamine-faced fiberboard, HD–hardwood dowel.
Supplies: #8x1" and #8x1¼" flathead wood screws, 2" strap hinges with screws, #10 SAE flat washers, ¼-20 press-in threaded inserts, ¼-20x1¼" roundhead machine screws, chalkboard paint.
Blades and bits: Stack dado set, ¾" Forstner bit, ¼" roundover and ⅜" rabbet router bits.

Source

Paper. 24"x150' paper roll no. 11501-1120, $14.99. Dick Blick. Call 800/828-4548, or go to dickblick.com.

10 keys to successfully building WOOD® projects

We pack all of the necessary steps into every *WOOD* magazine project article, but we always wish we had more room to talk about the best methods for achieving those steps. So here are our Top 10 keys to good woodworking, based on our project builders' many years of experience. Make these pointers part of your workshop routine, and we guarantee you'll make fewer mistakes and produce better results.

1. Look ahead.

Don't waste time and effort by cutting a part too small, or realizing too late that your hardware doesn't fit quite the way ours did. Avoid problems by noting the asterisks in the materials list, which designate parts to cut oversize. If you decide to substitute different hardware for the items shown in our buying guide, plan for any corresponding changes in construction. Whether you substitute or stick with our recommendation, buy the hardware before starting to build the project.

2. True up your stock.

When you need absolutely flat parts—for door frames or tabletops, for example—always face-joint each part and then run it through the planer. The jointer makes one face flat, and the planer makes the opposite face both flat and parallel to the first one. Before moving on to shaping and assembly, thickness all of your solid stock without changing the planer setting.

3. Get the best out of the grain.

Beginners treat all lumber as equal, but experts use each board to its best advantage. Look for an interesting figure to make an eye-catching box lid or cabinet door panel. Set aside straight, even grain for making panels, rails, and stiles. When edge-gluing boards, take time to find an arrangement in which the grains seem to blend together.

4. Rip slightly overwidth.

When you're cutting parts to final width, leave an extra 1/32" as you rip them on the tablesaw. Use light passes on your jointer to remove the saw blade marks and trim the parts to their final width.

5. Double-check sheet goods.

Before you cut rabbets or dadoes to receive plywood or other sheet goods, measure the thickness of finish-sanded pieces, and make a test cut in scrap. Don't assume that the sheet material is exactly ¾" or some other nominal dimension.

6. Start using stops.

Most projects call for two or more identical parts, or parts of the same length. Just use a stop to guarantee perfect matches. In most cases, all you need is a simple block clamped to a tablesaw miter gauge auxiliary extension, your mitersaw fence, or your router table fence, as shown *above*.

7. Sand and stain in advance.

Don't wait until after assembly to sand and finish some parts. For example, finish-sand the inner edges of the frame and the profile of a panel before assembling a raised-panel door. If you're using stain, apply it to the panel before assembly, too, to avoid unstained areas that might show up later when the panel contracts.

8. Dry-fit before gluing.

Halfway through a major glue-up, nothing's more frustrating than realizing two parts won't go together. Test-fit each joint as you go; then assemble the entire piece, using only clamps. If that's not practical, dry-fit and glue sub-assemblies to make sure those units fit together properly.

9. Glue with care.

If every joint you make becomes a glue-gusher during assembly, you're using too much adhesive. Spread an even coat of glue on one piece of each joint. You're using the perfect amount when clamping produces a line of small glue beads along the joint. Wait about half an hour until the squeeze-out becomes rubbery, and remove it with a sharp paint scraper. Clean the scraper frequently with a paper towel to avoid pushing a glob of glue across the surface.

10. Give the glue time.

In 70-degree conditions, a yellow glue joint requires an hour of clamping and a day of drying to reach full strength. But if you're working in a cold garage in the winter, double the clamp time and drying time for each 15-degree drop below 70 degrees. Ordinary yellow glue works down into the mid-40s, but the temperature of the wood is more critical than the air temperature. If your lumber has been in freezing conditions all night, don't expect a space heater to warm it to optimal levels in a short time.

our editors test

detail sanders

Why buy?

The best tools make difficult tasks easier, and detail sanders certainly fit that description. The flat, pointed tips of these sanders help you power-sand into corners and narrow gaps beyond the reach of a random-orbit or finish sander. Hook-and-loop abrasives make replacing them simple. And you'll find the results from a detail sander far more consistent (and less painful) than the "finger wrapped in sandpaper" method. As a group, these sanders vibrate less than a random-orbit or finish sander and prove surprisingly aggressive. (Don't confuse these flat-sanding tools with powered "profile sanders" that use interchangeable abrasive-wrapped tips for smoothing contoured profiles, such as molding.)

Fein MultiMaster, $190 (MSXE-636-2)

Editor test-drive:

I expect excellent quality and performance from a top-dollar tool and I got it with the MultiMaster. In short, it's a professional-grade tool that fits comfortably in my hand and runs quietly through its full 12,000–21,000 oscillations-per-minute speed range. The tool's thin, triangular sanding head makes it easy to sand into tight spaces, such as between slats of Mission-style furniture, and into corners.

I quickly learned that the center-pivoting pad of the MultiMaster sands aggressively, even using the finest abrasive supplied with the kit (120 grit). To minimize scratching, I had to lighten my pressure on the tool and keep it moving.

I replaced MultiMaster's sanding head with the segment saw blade and flush-cut dowel pegs without marring the surrounding surfaces. The blade's mounting screw protrudes below the bottom of the blade, so I was limited to cutting dowels that were within 1" of the edge of the workpiece. (Fein sells an offset blade for flush-cutting without any restrictions.) And the offset scraper blade included with the kit offers a power assist for scraping tasks, such as removing glue, caulking, putty, vinyl tile, etc.

—Tested by Owen Duvall, Project Editor

To learn more: 800/441-9878; feinus.com

Bosch Corner/Detail Sander, $120 (1294VSK)

Editor test-drive:

Instead of pivoting from the center like the Fein MultiMaster, the Bosch 1294VSK's sanding pad orbits like the pad of a finish sander (at 13,000–19,000 orbits per minute). This orbiting action results in a nearly scratch-free finish. And yet, the tool removes material almost as aggressively as my random-orbit sander.

The five interchangeable pads and extensions provided with the 1294VSK kit (shown at *left*) swap quickly and easily, thanks to a tool-free connection. I used this feature more often, though, to rotate a fresh corner of the sandpaper to the front point, where the abrasive wears fastest.

Those extensions all serve specific purposes: With the extension pad, I sanded under the toe space of a cabinet; the narrow extension fit well between the spindles on an end table I built. The oval extension isn't flat, but gently curved, and works great for sanding contoured pieces. I only have one concern about the narrow extensions: None of my local tool stores carry replacement abrasives in stock, but they could order them for me. I also found them online through the dealer locator on Bosch's Web site.

—Tested by Pat Lowry, Techniques Editor

To learn more: 877/267-2499; boschtools.com

Grizzly Triangular Sander, $25 (G9907)

Editor test-drive:

If you need a detail sander for just a few jobs a year, you want a tool that noses into corners without digging too deep into your wallet. The low-price Grizzly Triangular Sander (G9907) is just the ticket.

I recently completed assembling a hall table and realized I had planned to round over some edges that I could no longer get to with a router. When I powered up the G9907, I was surprised at how little it vibrated compared to my palm sander. Yet it removed stock quickly, and in no time flat I had sanded all the round-overs with one piece of sandpaper. That single piece of 100-grit abrasive is all that comes with the sander, so make sure you get extra when you pick up the tool; Grizzly sells a 5-pack of assorted grits from 60 to 240 for $3.

Two minor criticisms: First, the tail of the tool is the most comfortable place to hold it, but I liked to keep my hand closer to the nose of the tool (where the body is bulkiest) for best control. Second, the cooling fan on the motor tended to blow dust up and into my face when I tilted the sander from flat. Still, for the few times I need it, I can live with both, and spend the money I saved for other tools and projects.

—Tested by Marlen Kemmet, Managing Editor

To learn more: 800/523-4777; grizzly.com

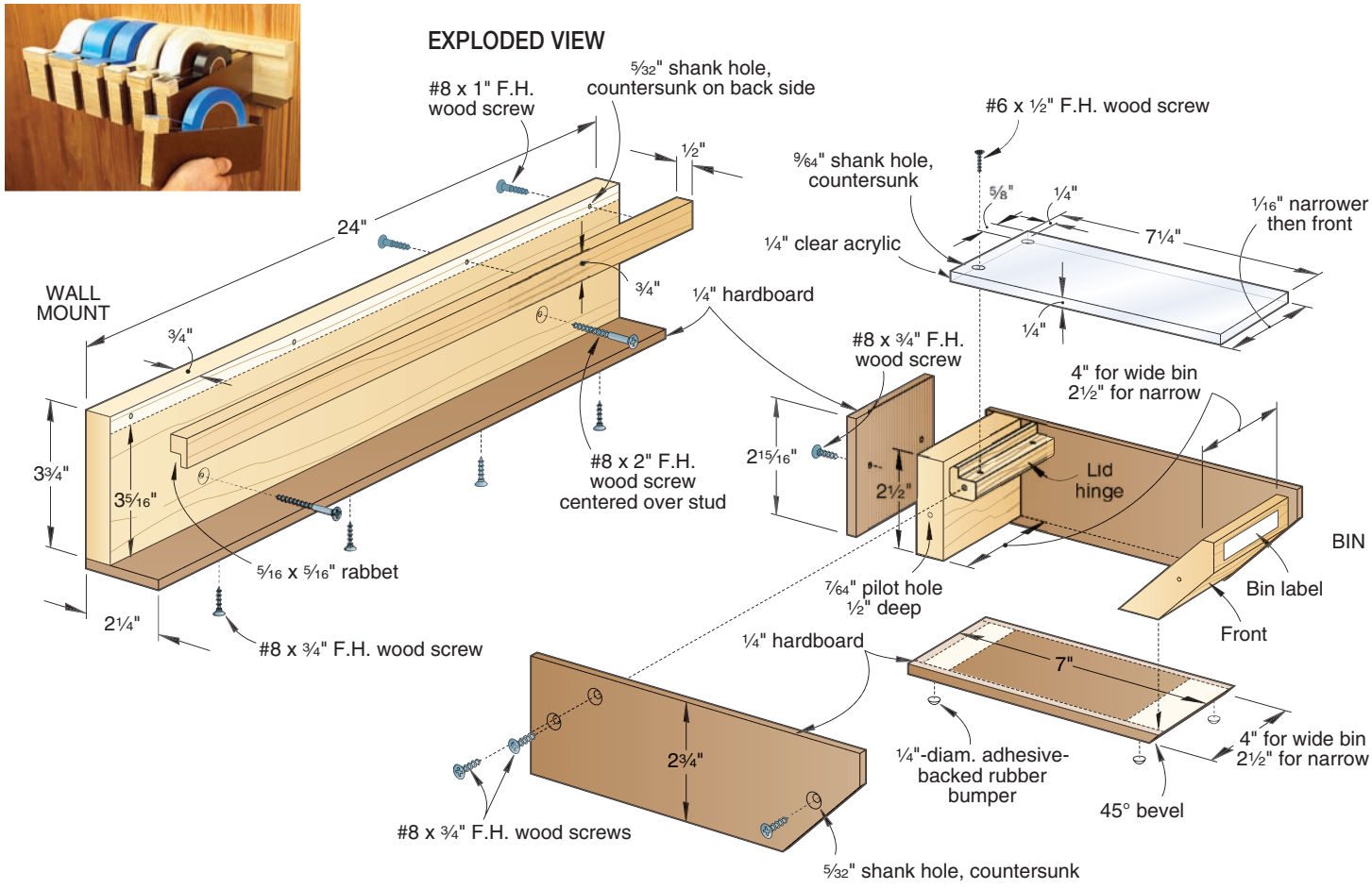
take-anywhere

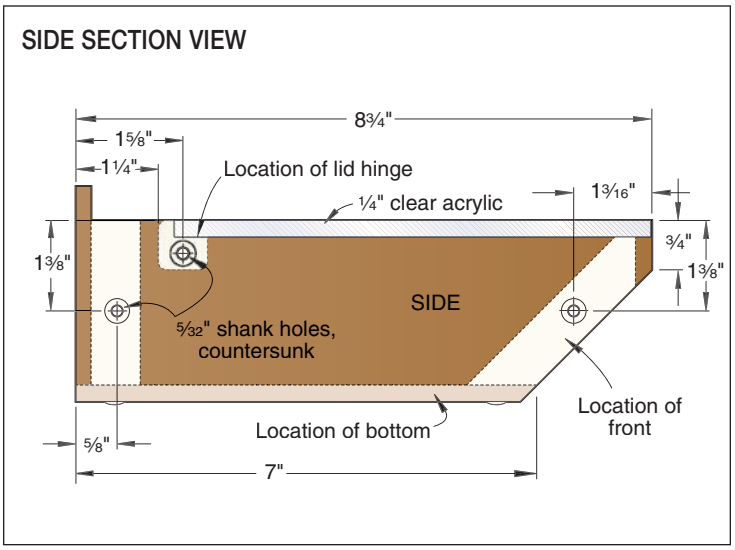
hardware bins

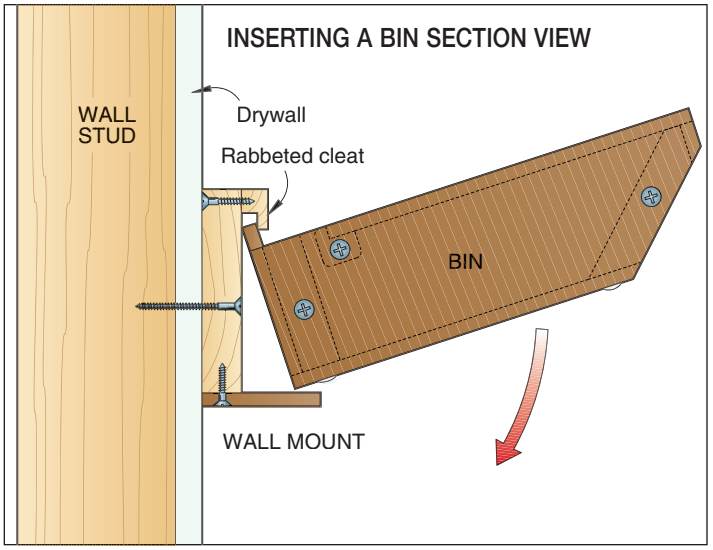
Carry these simply made containers to your work area; return them to the holder when you're done.

In issue 164 we shared with you the wall-hung tape dispensers shown *below* that dismount to go where you need them. Now, using that same concept, further organize your shop with these handy hardware bins.

Start by determining how many bins you'll need in your shop and what width— 2½" or 4". Cutting your pieces in multiples, build as many bins as you like. (See the *WOOD Patterns*® insert for full-size patterns of the bin front and lid hinge.







We cut the lid hinges 1⁄16" less in length than the interior openings. We glued and screwed the hardboard sides to the solid-stock fronts and backs.) Using a sharp 40-tooth combination or triple-chip carbide blade, cut the acrylic covers to size. Drill countersunk mounting holes and secure the acrylic covers to the rabbeted pivots.

Build the wall mount(s) as dimensioned. Attach them in place using fasteners appropriate to your shop wall. To hang a bin from the wall mount, simply lift the front end of the bin while inserting the top edge of the back into the rabbeted cleat of the wall mount where shown *above*. The design lets you remove hardware from the wall-mounted bins in place or remove a bin from the mount and move it to your work area.

Project design: **Jeff Mertz**

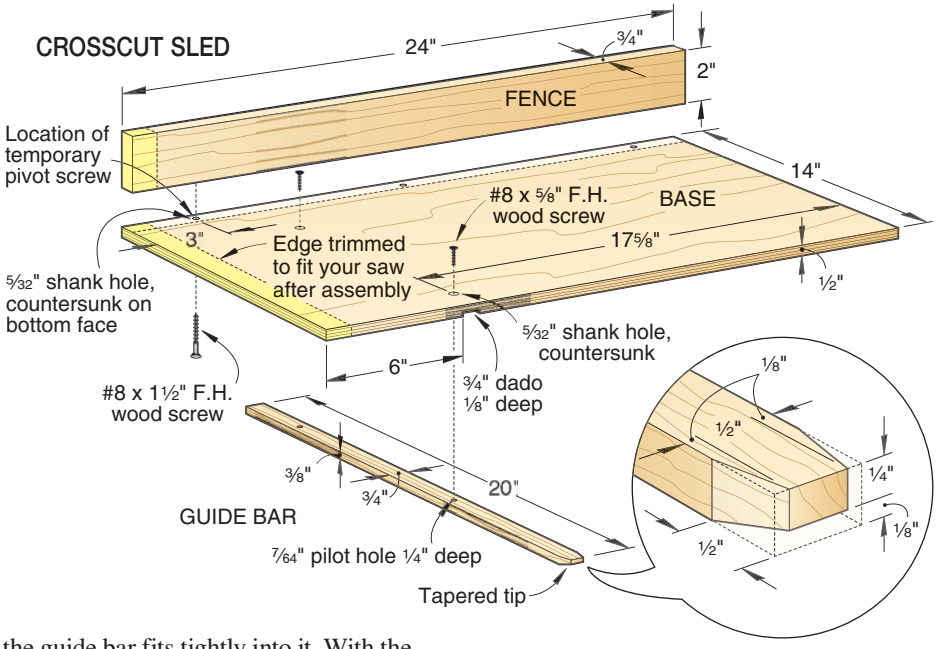
straight-tracking crosscut sled

For cutting long or wide stock on your tablesaw, this simple jig is like having another pair of hands.

With a long, wide base securely anchored to a 20"-long miter-gauge slot guide bar, this crosscut sled provides a lot more workpiece support than a standard miter gauge. And it's so inexpensive and easy to build that every tablesaw should have one. Here's how to make yours.

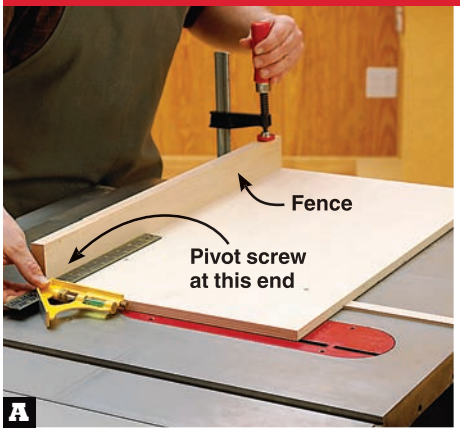
Start with the guide bar. To make it, joint one edge of a ¾"-thick board 24" long, and then rip a 13⁄16"-wide strip from it. (We used maple.) Adjusting your planer to just shave the surface, reduce the 13⁄16" width in multiple passes until the piece slides in your tablesaw miter-gauge slot without play. Now rotate the piece 90° and plane the original ¾" thickness to ⅜". Trim the guide bar to 20" long, and sand tapers on the front end, where shown on the drawing at *right*.

From ½" plywood or medium-density fiberboard, cut the 14×24" base. With a ½" dado blade, cut a ⅛"-deep dado in the base, 6" from one end. Then moving the rip fence in small increments, widen the dado until the guide bar fits tightly into it. With the back end of the guide bar and base flush, drill countersunk screw holes and fasten the guide bar into place.

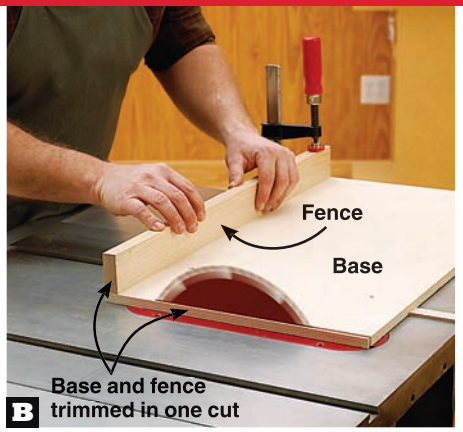


continued on page 98

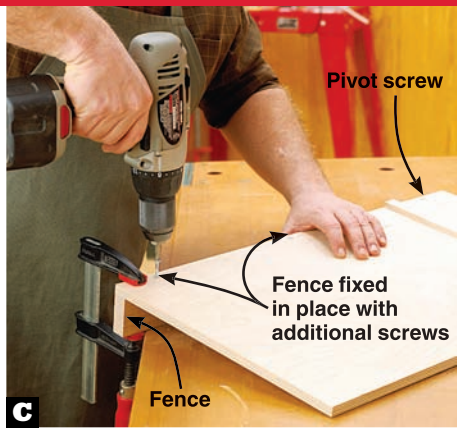
THREE STEPS TO PERFECT 90° CROSSCUTS



Square the fence to the end of the base and secure the free end with a clamp.



With the guide bar riding in the miter-gauge slot, trim the end of the base and fence.



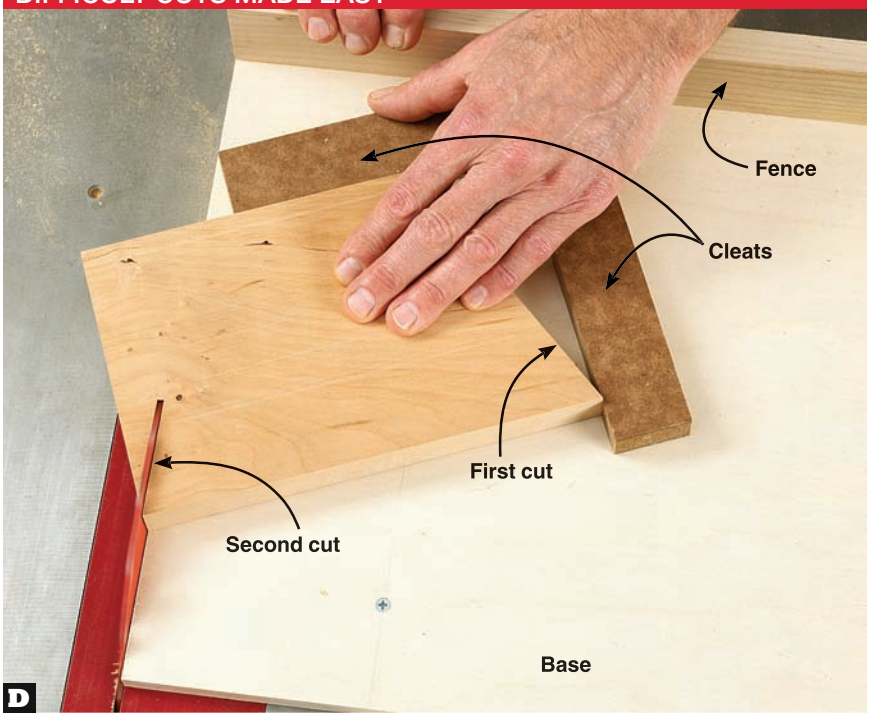
Recheck the fence for square. Then fix the fence position with two more screws.

Cut the ¾×2×24" fence (any piece of straight and flat stock will do). Clamp it to the base, flush with the ends and back edge. From the bottom, drill a countersunk screw hole for the temporary pivot screw, where shown on the drawing on *page 96*, and drive the screw. Then follow the three steps shown in **Photos A**, **B**, and **C** to square the fence to the blade. Now finish-sand the jig and protect it with two coats of finish.

Using the crosscut sled

The jig easily handles unwieldy parts, such as the 11¼"-wide by 43"-long sides of the bookshelf on *page 76*. To use the sled, simply hold the workpiece down on the base and tight against the fence, as shown in the top photo on *page 96* Because you trimmed the jig flush with the blade, you can align your cutline with the end of the base. The wide base and extra-long guide bar allow you to start a cut with the fence well off the front edge of the table without sacrificing workpiece support or a square cut. For cutting several pieces shorter than the sled to the same length, clamp a stopblock to the fence where needed. You also can fasten cleats to the base to position hard-to-hold parts for angled cuts, as shown in **Photo D**.

DIFFICULT CUTS MADE EASY



To position parts for angled cuts, fasten cleats to the base with cloth-backed double-faced tape or drive flathead woodscrews from the bottom.

what's ahead

A sneak peek at some of the articles in the November issue (on sale October 11)

Projects big and small

FEATURED PROJECT

Classic workbench

Here's the bench you've dreamed about. Its rugged good looks belie the down-to-earth construction featuring simple but solid joinery. The doors and drawers are optional.

Hall table and curio shelf

Enhance your home's interior by building one or both of these matching pieces.

Turned ornament

The tiny tree within this mini-lathe-compatible project sparkles in the holby glow.

Scrapbook/photo album jacket

Laminate wood scraps into an attractive binder for your favorite family mementos and photographs.

Shop cart

A sheet of plywood is all you'll need to build this mobile helper. It doubles as a tool stand.

Tools and techniques

TOOL TEST

Step-up bandsaws

Ready for a bigger bandsaw? Curious about the advantages of a larger machine? We test six models with at least 10" of resaw capacity.

Hanging how-to

Learn our three favorite ways to conveniently wall-mount heavy shelves and cabinets.

Workshop workover

If your shop is cramped and in need of better organization, tag along as we redo this reader's tight basement space.

Reducing wood waste

See how pro Carl Stammerjohn wrings the most usable stock from every board and saves big bucks in the process.

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